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<110> Abe, Yuki  
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<150> JP 2000-116591

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<150> JP 2000-117458

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<213> Artificial Sequence

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<221> misc\_feature

<223> Description of Artificial Sequence: A mixed primer  
which has a DNA sequence deduced from the amino  
acid sequence of PKS of *Aspergillus flavus*.

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<221> modified\_base

<222> (6)..(6)

<223> i

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<221> modified\_base

<222> (9)..(9)

<223> i

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<210> 4

<211> 17

<212> DNA

<213> Artificial Sequence

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<221> misc\_feature

<223> Description of Artificial Sequence: A mixed primer  
which has a DNA sequence deduced from the amino  
acid sequence of PKS of Aspergillus flavus.

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<222> (15)..(15)

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<211> 19

<212> DNA

<213> Penicillium citrinum

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<210> 6

<211> 19

<212> DNA

<213> *Penicillium citrinum*

<400> 6

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<210> 7

<211> 18

<212> DNA

<213> *Penicillium citrinum*

<400> 7

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<210> 8

<211> 20

<212> DNA

<213> *Penicillium citrinum*

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<211> 20

<212> DNA

<213> *Penicillium citrinum*

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<211> 19

<212> DNA

<213> *Penicillium citrinum*

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<210> 11

<211> 20

<212> DNA

<213> *Penicillium citrinum*

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<210> 12

<211> 19

<212> DNA

<213> *Penicillium citrinum*

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<211> 21

<212> DNA

<213> Penicillium citrinum

<400> 13

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<211> 19

<212> DNA

<213> Penicillium citrinum

<400> 14

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<210> 15

<211> 20

<212> DNA

<213> Penicillium citrinum

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<210> 16

<211> 21

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<213> *Penicillium citrinum*

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<210> 17

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<212> DNA

<213> *Penicillium citrinum*

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&lt;211&gt; 760

&lt;212&gt; DNA

<213> *Penicillium citrinum*

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<211> 773

<212> DNA

<213> *Penicillium citrinum*

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660

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<210> 20

<211> 527

<212> DNA

<213> *Penicillium citrinum*

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120

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cgttgataaa gcagaatggg gctctttggt cgaaggaagt cgaagcttga tcaccggccc  
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<210> 21

<211> 522

<212> DNA

<213> *Penicillium citrinum*

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<210> 22

<211> 541

<212> DNA

<213> *Penicillium citrinum*

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<212> DNA

<213> *Penicillium citrinum*

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<210> 24

<211> 20

<212> DNA

<213> *Penicillium citrinum*

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<212> DNA

<213> *Penicillium citrinum*

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<210> 26

<211> 20

<212> DNA

<213> *Penicillium citrinum*

<400> 26  
caacgcccaa gctgccaatc  
20

<210> 27

<211> 20

<212> DNA

<213> *Penicillium citrinum*

<400> 27  
gtcttttcct actatctacc  
20

<210> 28

<211> 20

<212> DNA

<213> *Penicillium citrinum*

<400> 28  
ctttcccagc tgctactatc  
20

<210> 29

<211> 1524

<212> DNA

<213> *Penicillium citrinum*

<400> 29  
aactggaaga attcgcggcc gcaggaattt tttttttttt tttttttcaa cgaaggtaga  
60

agtaattttg acaaagatac aagacgaatt cgctatttgt agatgaatat gcgtgtgtca  
120

attgaagccg aattcaggat agatttgcca tctgctctat tgccaatttc taatccatct  
180

ttatcatgaa caacactcaa accacacatc tgaattcacg gcgctgaacg atctaggcca  
240

acttcagagc cgggttcacg gagaacatag tgaggattga agaaaagtgg tctacaaagg  
300

cctgagcgtg ctcagggcca tacagcgagc tctgaagttt gacatgaatg agtgggtcct  
360

tggtagggtc atcccacatc tcgagaacga tgtcataagg agtgcgctca cgggaagcga

420

gaacactcgt cattttggca ttgccaattg agccactctc cgcttgaccc tgcttgtaat  
480

caaagacagc ctggaacaag ggggcgtgtg tctgagtctt gggttcctcg cctgaggtag  
540

ggagattcag gcctagacag tcgaggatga cgccatacgg caccgcgcgcg tgttgcatgg  
600

cctcacgcac actgtccttg gtggctacaa ggtgctcgcc gaatgtcttg ctgccgacga  
660

actcatcaaa gcgcagggga agcacgttag cgaaaaagcc catcgccgaa atttcttcca  
720

tggtggatcg gttggtttcg gcgaggccga tggttatgtc ttgctgccg gtaagacgcg  
780

ccaacaaaac gtggtaggcg gccaggtaga actgcatggg ggttgccttg tgcttgccgc  
840

tccgctcttt gattcggaag gcgaccatgg gatctaaacg agcaattgct tcatactgct  
900

gccacgtgaa tggctgtatt tgctgctgct ctgaattggc agcagggtca ttgatcagat  
960

tcatgatggg aagcacgggt ggcgagatg acgagacttt gctatgcatg gacttccaga  
1020

acgcgatatc gtccccatt cgcccatttt ccaggttttc ccgctgttgg acggctagat  
1080

cagagaattg ggtcgatggg cgctgcattt tcaccccgct gtaaactctgc ccgatctcat  
1140

tgaacagggt ttctgttggt gagccatcac caactaatct gtggtagccg attaccaaca  
1200

ggtggtcatc tgtgccccag tagaaatcaa cgagtctgag agtgtcacct gtggagatgc  
1260

tatagtttgt cttctcgagt ttccggtact cttcctctgc ctccgcagcg ttgttcacct  
1320

gaacaaagtg cactctgttc tccgggttct tgagaaccac ttggacggga ccatttaa  
1380



cgctgctata gtcacgcca gtaacaaagc acgtacggaa gatctcgtga cggcgcaatg  
1440

aggctttcag agcccgccctc aaccggtcga ggtcaatggc acccttcacg aacatgccaa  
1500

tagtggtggt gaagatggta tgat  
1524

<210> 30

<211> 784

<212> DNA

<213> *Penicillium citrinum*

<400> 30

aactggaaga attcgcggcc gcaggaattt tttttttttt tttttttttc tttgttgctt  
60

ctcagggcca ctgtaatggc atttcaggta tctctattta ctgctatcca gaagtcaggc  
120

attaaatagt caggctcagc ccaggctcga ttcagattgg attcaggctt cagaccatgg  
180

ccgctatgct ccttcgtact atacctccgt cgagctatac ccgcttggcc agacaaaagg  
240

cttcactgaa cccttcaact taactgcatt tcgccacaac taactcgacg aggccggcga  
300

tggtggtacc attcatgagc tcaaagatcg acacatcaac atggatttca gatgtgatcc  
360

agtttcgaag ttcaatggcg acgagtgagt ctacgccgac acctgccagg tttttggacg  
420

aggacatgtc gtcttctgcc agaccaaaca ttcgcatcag cttttccgtc attgctttga  
480

ggacgataga aatggcctcg tcgtgagagg tgaccctgct tagttgggccc cgcacgccat  
540

ctggtccttt tttatgcgaa gagacaaagg attggtctgc atgaaggact tggcggtatt  
600

taagtccac aaaccgctgt tcctgtatcc agtttgcctc ggtccagtga gcacccgggg  
660

atgtgttgat tcctgtaacc acagctgcgg gaggtgatgg aaattgaggg gaagaacaca  
720

ggattgcctt ctccaacaca tccatgacgt ccttttcatg cataggcttg taacctattc  
780

tagc  
784

<210> 31

<211> 764

<212> DNA

<213> *Penicillium citrinum*

<400> 31

aactggaaga attcgcggcc gcaggaattt tttttttttt tttttttttc gaataaaatg  
60

cgttttatth tactaaccta ctcgactaat acagcaccta gtttctctgg gacggaaacc  
120

attggaataa gcctggggac ggatgcatat ttgttttagt ttgcgtgtta tatcttagca  
180

ccggtcatga gggagcggga tgtcctcgth gcgccggcgt accatgagct ttgtggttgg  
240

atgcatacga acgctaaaag cgtgacggta gtatttgtca tcgtctcctg gtacaggctt  
300

cacatcatat tgaatcagta tatgagcgag gagaatcttg atttccttcg aggcgaagaa  
360

ccgcccggga caagcgcgtg ggttccagcc gaagccgatg tgatcaccgt tggatattctc  
420

caattgagcg gtgaaggcct tgtctggatc ctgcgcgatg cgcataaatc ggtagggatc  
480

ataattttcg gggttttccc acacatcagg gttgttcatg cggctctgcag ccacagcggc  
540

caactcgccc ttgggaatga agaggccatt ggatagagtg atgtctctga gagcgggtact  
600

gcgcatagtg gcgcactcga ccggcttgat tcgctgcgtc tctttcatgc agctgtcgag  
660

gagcttcagc ttgaacagag aggcaggcgt ccagccccct tctccgatta cagtgcggat  
720

ctcttggcgg agaggctgaa taaggctctgg gtgcctggca atgt  
764

<210> 32

<211> 765

<212> DNA

<213> *Penicillium citrinum*

<400> 32

aactggaaga attcgcggcc gcaggaattt tttttttttt ttttttctgg aaaaggacca  
60

tctctttata tattcttctt ccctactact tgcacgtaa atttcaacaa catataaaca  
120

tgagataccc tttctggccg ttcactctac cacctgcctg tctcattgca ttgtgctttt  
180

gaaaattatg acaataacaa ccaatgagaa aaaatatgat cctcctgcaa tgaatccact  
240

ggagggggta cggagcttgg aatgctccta agattccgac ctaatcagcg tcgagcccga  
300

tcagtagctg cagcactcgg cctcagtgca ttgttaggaa cagggactgt cctgggttccg  
360

cctgacgggg agacacttcg agaaggggct gaagatgccg gggcagaacg gttgtgcgcc  
420

atgtgcgcct tgaccaggtg accggcggct agggcagcac atagcgagag ctccccagcc  
480

aaaacagcgc ttccgatgat gcgcgcaagt tgacgtgcat tctcaccggg agtgggtcggg  
540

tgtgatccgc ggacaccaag catgtcaagc attgcgccct ggggctccag aatcgtacca  
600

ccgcccacg ttccaacctc aatagacggc atggagacag agatttgaag cgatccgcga  
660

agattgttca tgagagtgat gcagttagcg ctctccacaa cttgcgccgg atcctgacct  
720

gtggcaatga aaatggctgc cgcaagattg gcagcttggg cgttg  
765

<210> 33

<211> 802

<212> DNA

<213> *Penicillium citrinum*

<400> 33

aactggaaga attcgcggcc gcaggaattt tttttttttt tttttataga atctttgaaa  
60

tcgacattaa ttaagtatgt ggagattctt tgtggaggca cggtaatgtg tctatctagc  
120

aacgcggtca agcatcagtc tcaggcacag cccgggtgtc gtttttggtt gcaatcttcc  
180

gccatcccat tccaaaggca aacacaaacg tgcacgccgt agctcccact gctaagtaaa  
240

aagtatgatc aacggcgaga ctgtaagctt ttacaacccc tggaagggtta ttcttgctga  
300

ccacatctct gaagccagtc gcccctgctg ccgtcacggc ctgcgtgtcg acagtgggcg  
360

catacttgct caggccagtt ctcaaaccgg acccaaagac aaggtttagca aagtccagga  
420

agagcgatcc tccaaacgtc tgtccaaaca cggcgagaga aattccgagg gcaccttggt  
480

cgggcgaaag cgtgctttgg atggcgatga taggcgtttg catgccacaa ccacgaccga  
540

agcccgcgat aaattggtac atgacccatt tcacagttga tgtatggggc tggaaggtgg  
600

ataccagacc tgcgcctatg gcgacgagaa cagcgctgcc tagggcccaa ggcaaatagt  
660

atcctgtctt tccaattgcg aagccagaaa ccatagccat aatgacttgt ccaagaattc  
720

caggcaacat gtacacacca ctcaagtgtg gagaaacatc cttcacagcc tggaagtaga  
780

tcggtagata gtaggaaaag ac  
802

<210> 34

<211> 562

<212> DNA

<213> *Penicillium citrinum*

<400> 34

aactggaaga attcgcggcc gcaggaattt tttttttttt ttttttttac taagcaatat  
60

tgtgtttctt cgctaattgcg aatatttcct tatagcaacg tcgcaacaca tttatcgtct  
120

tccttgaggc ctttgttgac ttgggctctt cgtctccggc ttcgtcactc caaagcacag  
180

ataggagacg agaggccggc gttatggttt tatttttcagc gccaaaggatt tgccacgatg  
240

tgcttggcat atctgatagg actagacgaa tagatgccgc agccccgtgc tcctgtgcta  
300

tcccaaagc agtctcaatc ccactcaata gtcgaaggct tacacgcaat gtcgtgcatg  
360

cagaagataa ggcgtgcatg aatgggtcga gatgtgaaat gagctcgccg atatgaagat  
420

tagagtgaat cgagggaagt gcttcggctc ttccattgtc atttctagtg gttgagccag  
480



accagtacca atccattcgt gtgctttgct tttgtccaca aggttgggct ttcacacct  
540

cggatagtag cagctgggaa ag  
562

<210> 35

<211> 26

<212> DNA

<213> *Penicillium citrinum*

<400> 35  
gttaacatgt cagaacctct accccc  
26

<210> 36

<211> 27

<212> DNA

<213> *Penicillium citrinum*

<400> 36  
aatatttcaa gcatcagtct caggcac  
27

<210> 37

<211> 1662

<212> DNA

<213> *Penicillium citrinum*

<220>

<221> CDS

<222> (1)..(1662)

<400> 37

atg tca gaa cct cta ccc cct aaa gaa ggg gaa cca agg cca cag aag

48

Met Ser Glu Pro Leu Pro Pro Lys Glu Gly Glu Pro Arg Pro Gln Lys

1

5

10

15

gaa gaa agt caa aat gac acg ctc gaa gcg act gag tcc aag tcc cag

96

Glu Glu Ser Gln Asn Asp Thr Leu Glu Ala Thr Glu Ser Lys Ser Gln

20

25

30

cac atc aca ggc ctc aag ctc ggg ctg gtg gtt gct tca gtt act ttc

144

His Ile Thr Gly Leu Lys Leu Gly Leu Val Val Ala Ser Val Thr Phe

35

40

45

gta gca ttt ttg atg ctc ctt gat atg tcc att atc gtc acg gca atc

192

Val Ala Phe Leu Met Leu Leu Asp Met Ser Ile Ile Val Thr Ala Ile

50

55

60

cca cat atc aca agc gag ttc cac tct ctg aac gat gta ggg tgg tac

240

Pro His Ile Thr Ser Glu Phe His Ser Leu Asn Asp Val Gly Trp Tyr

65

70

75

80

ggc agt gct tat ctt ctg gct aac tgt gct ctc cag ccc ctg gcc ggt

288

Gly Ser Ala Tyr Leu Leu Ala Asn Cys Ala Leu Gln Pro Leu Ala Gly

85

90

95

aaa ttg tat aca ctc ttg ggc ttg aag tac act ttc ttt gcc ttc ctc

336

Lys Leu Tyr Thr Leu Leu Gly Leu Lys Tyr Thr Phe Phe Ala Phe Leu

100	105	110
tgt att ttt gaa cta ggc tcg gtg cta tgc ggt gcc gca aga tct tcc		
384		
Cys Ile Phe Glu Leu Gly Ser Val Leu Cys Gly Ala Ala Arg Ser Ser		
115	120	125
acc atg ttg att gtt ggg cgg gcc gtt gct gga atg gga ggc tca ggt		
432		
Thr Met Leu Ile Val Gly Arg Ala Val Ala Gly Met Gly Gly Ser Gly		
130	135	140
ctt gtc aac gga gcc ctc aca atc ctc tca aca gct gct cct aag cac		
480		
Leu Val Asn Gly Ala Leu Thr Ile Leu Ser Thr Ala Ala Pro Lys His		
145	150	155
aag caa cca gtt ttg att gga gtg atg atg ggt ctt agt cag att gcc		
528		
Lys Gln Pro Val Leu Ile Gly Val Met Met Gly Leu Ser Gln Ile Ala		
165	170	175
att gtc tgt gga cca ctg ctc gga ggt gct ttc act caa cac gcc act		
576		
Ile Val Cys Gly Pro Leu Leu Gly Gly Ala Phe Thr Gln His Ala Thr		
180	185	190
tgg cga tgg tgc ttt tat atc aat ctc ccc atc ggc gct gtc gct gca		
624		
Trp Arg Trp Cys Phe Tyr Ile Asn Leu Pro Ile Gly Ala Val Ala Ala		
195	200	205
ttc ctc ctt ctc gtc atc acc ata ccc gac cga att tca tcc acg gac		
672		
Phe Leu Leu Leu Val Ile Thr Ile Pro Asp Arg Ile Ser Ser Thr Asp		

210	215	220
agc gaa ctc tcg acc gac aaa cca atg gcc aac ata aaa tcc aca ctt		
720		
Ser Glu Leu Ser Thr Asp Lys Pro Met Ala Asn Ile Lys Ser Thr Leu		
225	230	235
cgc aaa ctg gac ctt gta ggc ttt gtg gtc ttt gca gcc ttc gca acc		
768		
Arg Lys Leu Asp Leu Val Gly Phe Val Val Phe Ala Ala Phe Ala Thr		
245	250	255
atg att tcc ctc gca cta gaa tgg gga ggg tcg acc tac acc tgg cga		
816		
Met Ile Ser Leu Ala Leu Glu Trp Gly Gly Ser Thr Tyr Thr Trp Arg		
260	265	270
agt tcc gtc atc atc ggc ctg ttc tgt ggc gga ggg ttt gct ctg att		
864		
Ser Ser Val Ile Ile Gly Leu Phe Cys Gly Gly Gly Phe Ala Leu Ile		
275	280	285
gcg ttc gtg cta tgg gag cgt cat gtt ggc gat gct gtt gcc atg att		
912		
Ala Phe Val Leu Trp Glu Arg His Val Gly Asp Ala Val Ala Met Ile		
290	295	300
cct ggc tca gtg gct ggt aaa cga caa gtg tgg tgc tct tgt tta ttt		
960		
Pro Gly Ser Val Ala Gly Lys Arg Gln Val Trp Cys Ser Cys Leu Phe		
305	310	315
atg ggc ttt ttc tct ggc tcc ttg ctt gtc ttt tcc tac tat cta ccg		
1008		
Met Gly Phe Phe Ser Gly Ser Leu Leu Val Phe Ser Tyr Tyr Leu Pro		
325	330	335

atc tac ttc cag gct gtg aag gat gtt tct ccc aca ctg agt ggt gtg  
1056

Ile Tyr Phe Gln Ala Val Lys Asp Val Ser Pro Thr Leu Ser Gly Val

340

345

350

tac atg ttg cct gga att ctt gga caa gtc att atg gct atg gtt tct  
1104

Tyr Met Leu Pro Gly Ile Leu Gly Gln Val Ile Met Ala Met Val Ser

355

360

365

ggc ttc gca att gga aag aca gga tac tat ttg cct tgg gcc cta ggc  
1152

Gly Phe Ala Ile Gly Lys Thr Gly Tyr Tyr Leu Pro Trp Ala Leu Gly

370

375

380

agc gct gtt ctc gtc gcc ata ggc gca ggt ctg gta tcc acc ttc cag  
1200

Ser Ala Val Leu Val Ala Ile Gly Ala Gly Leu Val Ser Thr Phe Gln

385

390

395

400

ccc cat aca tca act gtg aaa tgg gtc atg tac caa ttt atc gcg ggc  
1248

Pro His Thr Ser Thr Val Lys Trp Val Met Tyr Gln Phe Ile Ala Gly

405

410

415

ttc ggt cgt ggt tgt ggc atg caa acg cct atc atc gcc atc caa agc  
1296

Phe Gly Arg Gly Cys Gly Met Gln Thr Pro Ile Ile Ala Ile Gln Ser

420

425

430

acg ctt tcg ccc gaa caa ggt gcc ctc gga att tct ctc gcc gtg ttt  
1344

Thr Leu Ser Pro Glu Gln Gly Ala Leu Gly Ile Ser Leu Ala Val Phe

435

440

445



gga cag acg ttt gga gga tcg ctc ttc ctg gac ttt gct aac ctt gtc  
1392

Gly Gln Thr Phe Gly Gly Ser Leu Phe Leu Asp Phe Ala Asn Leu Val

450

455

460

ttt ggg tcc ggt ttg aga act ggc ctg agc aag tat gcg ccc act gtc  
1440

Phe Gly Ser Gly Leu Arg Thr Gly Leu Ser Lys Tyr Ala Pro Thr Val

465

470

475

480

gac acg cag gcc gtg acg gca gca ggg gcg act ggc ttc aga gat gtg  
1488

Asp Thr Gln Ala Val Thr Ala Ala Gly Ala Thr Gly Phe Arg Asp Val

485

490

495

gtc agc aag aat aac ctt cca ggg gtt gta aaa gct tac agt ctc gcc  
1536

Val Ser Lys Asn Asn Leu Pro Gly Val Val Lys Ala Tyr Ser Leu Ala

500

505

510

gtt gat cat act ttt tac tta gca gtg gga gct acg gcg tgc acg ttt  
1584

Val Asp His Thr Phe Tyr Leu Ala Val Gly Ala Thr Ala Cys Thr Phe

515

520

525

gtg ttt gcc ttt gga atg gga tgg cgg aag att gca acc aaa aac gac  
1632

Val Phe Ala Phe Gly Met Gly Trp Arg Lys Ile Ala Thr Lys Asn Asp

530

535

540

acc cgg gct gtg cct gag act gat gct tga  
1662

Thr Arg Ala Val Pro Glu Thr Asp Ala

545

550

<210> 38

<211> 553

<212> PRT

<213> Penicillium citrinum

<400> 38

Met Ser Glu Pro Leu Pro Pro Lys Glu Gly Glu Pro Arg Pro Gln Lys  
1 5 10 15

Glu Glu Ser Gln Asn Asp Thr Leu Glu Ala Thr Glu Ser Lys Ser Gln  
20 25 30

His Ile Thr Gly Leu Lys Leu Gly Leu Val Val Ala Ser Val Thr Phe  
35 40 45

Val Ala Phe Leu Met Leu Leu Asp Met Ser Ile Ile Val Thr Ala Ile  
50 55 60

Pro His Ile Thr Ser Glu Phe His Ser Leu Asn Asp Val Gly Trp Tyr  
65 70 75 80

Gly Ser Ala Tyr Leu Leu Ala Asn Cys Ala Leu Gln Pro Leu Ala Gly  
85 90 95

Lys Leu Tyr Thr Leu Leu Gly Leu Lys Tyr Thr Phe Phe Ala Phe Leu  
100 105 110

Cys Ile Phe Glu Leu Gly Ser Val Leu Cys Gly Ala Ala Arg Ser Ser  
115 120 125

Thr Met Leu Ile Val Gly Arg Ala Val Ala Gly Met Gly Gly Ser Gly  
130 135 140

Leu Val Asn Gly Ala Leu Thr Ile Leu Ser Thr Ala Ala Pro Lys His  
145 150 155 160

Lys	Gln	Pro	Val	Leu	Ile	Gly	Val	Met	Met	Gly	Leu	Ser	Gln	Ile	Ala	
				165					170					175		
Ile	Val	Cys	Gly	Pro	Leu	Leu	Gly	Gly	Ala	Phe	Thr	Gln	His	Ala	Thr	
			180					185					190			
Trp	Arg	Trp	Cys	Phe	Tyr	Ile	Asn	Leu	Pro	Ile	Gly	Ala	Val	Ala	Ala	
		195					200					205				
Phe	Leu	Leu	Leu	Val	Ile	Thr	Ile	Pro	Asp	Arg	Ile	Ser	Ser	Thr	Asp	
	210					215					220					
Ser	Glu	Leu	Ser	Thr	Asp	Lys	Pro	Met	Ala	Asn	Ile	Lys	Ser	Thr	Leu	
225					230					235					240	
Arg	Lys	Leu	Asp	Leu	Val	Gly	Phe	Val	Val	Phe	Ala	Ala	Phe	Ala	Thr	
				245					250					255		
Met	Ile	Ser	Leu	Ala	Leu	Glu	Trp	Gly	Gly	Ser	Thr	Tyr	Thr	Trp	Arg	
			260					265					270			
Ser	Ser	Val	Ile	Ile	Gly	Leu	Phe	Cys	Gly	Gly	Gly	Phe	Ala	Leu	Ile	
		275					280					285				
Ala	Phe	Val	Leu	Trp	Glu	Arg	His	Val	Gly	Asp	Ala	Val	Ala	Met	Ile	
	290					295					300					
Pro	Gly	Ser	Val	Ala	Gly	Lys	Arg	Gln	Val	Trp	Cys	Ser	Cys	Leu	Phe	
305					310					315					320	
Met	Gly	Phe	Phe	Ser	Gly	Ser	Leu	Leu	Val	Phe	Ser	Tyr	Tyr	Leu	Pro	
				325					330					335		
Ile	Tyr	Phe	Gln	Ala	Val	Lys	Asp	Val	Ser	Pro	Thr	Leu	Ser	Gly	Val	
			340					345					350			
Tyr	Met	Leu	Pro	Gly	Ile	Leu	Gly	Gln	Val	Ile	Met	Ala	Met	Val	Ser	

355					360					365						
Gly	Phe	Ala	Ile	Gly	Lys	Thr	Gly	Tyr	Tyr	Leu	Pro	Trp	Ala	Leu	Gly	
370					375					380						
Ser	Ala	Val	Leu	Val	Ala	Ile	Gly	Ala	Gly	Leu	Val	Ser	Thr	Phe	Gln	
385					390					395					400	
Pro	His	Thr	Ser	Thr	Val	Lys	Trp	Val	Met	Tyr	Gln	Phe	Ile	Ala	Gly	
					405					410					415	
Phe	Gly	Arg	Gly	Cys	Gly	Met	Gln	Thr	Pro	Ile	Ile	Ala	Ile	Gln	Ser	
					420					425					430	
Thr	Leu	Ser	Pro	Glu	Gln	Gly	Ala	Leu	Gly	Ile	Ser	Leu	Ala	Val	Phe	
					435					440					445	
Gly	Gln	Thr	Phe	Gly	Gly	Ser	Leu	Phe	Leu	Asp	Phe	Ala	Asn	Leu	Val	
450					455					460						
Phe	Gly	Ser	Gly	Leu	Arg	Thr	Gly	Leu	Ser	Lys	Tyr	Ala	Pro	Thr	Val	
465					470					475					480	
Asp	Thr	Gln	Ala	Val	Thr	Ala	Ala	Gly	Ala	Thr	Gly	Phe	Arg	Asp	Val	
					485					490					495	
Val	Ser	Lys	Asn	Asn	Leu	Pro	Gly	Val	Val	Lys	Ala	Tyr	Ser	Leu	Ala	
					500					505					510	
Val	Asp	His	Thr	Phe	Tyr	Leu	Ala	Val	Gly	Ala	Thr	Ala	Cys	Thr	Phe	
					515					520					525	
Val	Phe	Ala	Phe	Gly	Met	Gly	Trp	Arg	Lys	Ile	Ala	Thr	Lys	Asn	Asp	
530					535					540						
Thr	Arg	Ala	Val	Pro	Glu	Thr	Asp	Ala								
545					550											

<210> 39

<211> 31

<212> DNA

<213> *Penicillium citrinum*

<400> 39

ggatccatgt ccctgccgca tgcaacgatt c  
31

<210> 40

<211> 30

<212> DNA

<213> *Penicillium citrinum*

<400> 40

ggatccctaa gcaatattgt gtttcttcgc  
30

<210> 41

<211> 1380

<212> DNA

<213> *Penicillium citrinum*

<220>

<221> CDS

<222> (1) .. (1380)

<400> 41

atg tcc ctg ccg cat gca acg att ccg acg aac cta cgc cgt cgc gcg



48  
 Met Ser Leu Pro His Ala Thr Ile Pro Thr Asn Leu Arg Arg Arg Ala  
 1 5 10 15  
 ttt cga cgc tca tgt gac cgg tgt cat gca caa aag ctc aaa tgt acc  
 96  
 Phe Arg Arg Ser Cys Asp Arg Cys His Ala Gln Lys Leu Lys Cys Thr  
 20 25 30  
 ggt agc aat gcc aat tta gtc cgt gct cag tgt caa cgt tgt caa caa  
 144  
 Gly Ser Asn Ala Asn Leu Val Arg Ala Gln Cys Gln Arg Cys Gln Gln  
 35 40 45  
 gcc gga tta agg tgt gtg tac agc gaa agg cta ccc aag cgc aat tta  
 192  
 Ala Gly Leu Arg Cys Val Tyr Ser Glu Arg Leu Pro Lys Arg Asn Leu  
 50 55 60  
 cat aaa gaa gcc gca gct gga act aca aga gcc aca gaa acc tca caa  
 240  
 His Lys Glu Ala Ala Ala Gly Thr Thr Arg Ala Thr Glu Thr Ser Gln  
 65 70 75 80  
 ccg atg acc gcg aca tct tct acg gtc ttc tca tca ttg gca gag act  
 288  
 Pro Met Thr Ala Thr Ser Ser Thr Val Phe Ser Ser Leu Ala Glu Thr  
 85 90 95  
 cct cca cct tac tgc tca cca cct acg cat att ggc acc tcg gca ctc  
 336  
 Pro Pro Pro Tyr Cys Ser Pro Pro Thr His Ile Gly Thr Ser Ala Leu  
 100 105 110  
 aag gaa aca tta tca gaa cca tca gcg gca acc ctg caa ttc tat gat  
 384

Lys Glu Thr Leu Ser Glu Pro Ser Ala Ala Thr Leu Gln Phe Tyr Asp

115

120

125

aca tca atc aac ttt gat gat ccc gag tcg ttt ccc ggc ggc tgg cct  
432

Thr Ser Ile Asn Phe Asp Asp Pro Glu Ser Phe Pro Gly Gly Trp Pro

130

135

140

cag cca aat aca ttt cgc gac gat gcc aac agc aat gaa tct tcg ggg  
480

Gln Pro Asn Thr Phe Arg Asp Asp Ala Asn Ser Asn Glu Ser Ser Gly

145

150

155

160

ata cca gat cta ggc tac gac ttt gaa ggc cct ttg gat gca acg gcg  
528

Ile Pro Asp Leu Gly Tyr Asp Phe Glu Gly Pro Leu Asp Ala Thr Ala

165

170

175

cct gtc tcg cca tcg ctg ttt gac ctc gaa gta gag ggg aac tcg tca  
576

Pro Val Ser Pro Ser Leu Phe Asp Leu Glu Val Glu Gly Asn Ser Ser

180

185

190

tcc gga caa tcc aac aca agc aac acg caa cga gac ctt ttc gaa agt  
624

Ser Gly Gln Ser Asn Thr Ser Asn Thr Gln Arg Asp Leu Phe Glu Ser

195

200

205

ctg tcg gat gtg tca cag gac cta gag gta ata ctc cac ggg gtg act  
672

Leu Ser Asp Val Ser Gln Asp Leu Glu Val Ile Leu His Gly Val Thr

210

215

220

gtg gaa tgg ccc aag caa aaa att tta agc tac ccg ata ggg gac ttt  
720

Val Glu Trp Pro Lys Gln Lys Ile Leu Ser Tyr Pro Ile Gly Asp Phe

225		230		235		240
ttg aat gcc ttt ggt aga ttg cta cta cat ctt caa gaa cgt gtg atc						
768						
Leu Asn Ala Phe Gly Arg Leu Leu Leu His Leu Gln Glu Arg Val Ile						
	245		250		255	
acg agc agc aat agc agc atg tta gat ggg tgt ctg caa acc aag aac						
816						
Thr Ser Ser Asn Ser Ser Met Leu Asp Gly Cys Leu Gln Thr Lys Asn						
	260		265		270	
ttg ttc atg gcg gtg cat tgc tac atg ttg tct gtc aaa atc atg aca						
864						
Leu Phe Met Ala Val His Cys Tyr Met Leu Ser Val Lys Ile Met Thr						
	275		280		285	
tca ctt tcc cag ctg cta cta tcc gag gtg atg aaa gcc caa cct tgt						
912						
Ser Leu Ser Gln Leu Leu Leu Ser Glu Val Met Lys Ala Gln Pro Cys						
	290		295		300	
gga caa aag caa agc aca cga atg gat tgg tac tgg tct ggc tca acc						
960						
Gly Gln Lys Gln Ser Thr Arg Met Asp Trp Tyr Trp Ser Gly Ser Thr						
305		310		315		320
act aga aat gac aat gga aga gcc gaa gca ctt ccc tcg ttt cac tct						
1008						
Thr Arg Asn Asp Asn Gly Arg Ala Glu Ala Leu Pro Ser Phe His Ser						
	325		330		335	
aat ctt cat atc ggc gag ctc att tca cat ctc gac cca ttc atg cac						
1056						
Asn Leu His Ile Gly Glu Leu Ile Ser His Leu Asp Pro Phe Met His						

340	345	350
gcc tta tct tct gca tgc acg aca ttg cgt gta agc ctt cga cta ttg		
1104		
Ala Leu Ser Ser Ala Cys Thr Thr Leu Arg Val Ser Leu Arg Leu Leu		
355	360	365
agt gag att gag act gct ttg ggg ata gca cag gag cac ggg gct gcg		
1152		
Ser Glu Ile Glu Thr Ala Leu Gly Ile Ala Gln Glu His Gly Ala Ala		
370	375	380
gca tct att cgt cta gtc cta tca gat atg cca agc aca tcg tgg caa		
1200		
Ala Ser Ile Arg Leu Val Leu Ser Asp Met Pro Ser Thr Ser Trp Gln		
385	390	395
atc ctt ggc gct gaa aat aaa acc ata acg ccg gcc tct cgt ctc cta		
1248		
Ile Leu Gly Ala Glu Asn Lys Thr Ile Thr Pro Ala Ser Arg Leu Leu		
405	410	415
tct gtg ctt tgg agt gac gaa gcc gga gac gaa gag ccc aag tca aca		
1296		
Ser Val Leu Trp Ser Asp Glu Ala Gly Asp Glu Glu Pro Lys Ser Thr		
420	425	430
aag gcc tca ggg aag acg ata aat gtg ttg cga cgt tgc tat aag gaa		
1344		
Lys Ala Ser Gly Lys Thr Ile Asn Val Leu Arg Arg Cys Tyr Lys Glu		
435	440	445
ata ttc gca tta gcg aag aaa cac aat att gct tag		
1380		
Ile Phe Ala Leu Ala Lys Lys His Asn Ile Ala		
450	455	

<210> 42

<211> 459

<212> PRT

<213> Penicillium citrinum

<400> 42

Met Ser Leu Pro His Ala Thr Ile Pro Thr Asn Leu Arg Arg Arg Ala  
1 5 10 15

Phe Arg Arg Ser Cys Asp Arg Cys His Ala Gln Lys Leu Lys Cys Thr  
20 25 30

Gly Ser Asn Ala Asn Leu Val Arg Ala Gln Cys Gln Arg Cys Gln Gln  
35 40 45

Ala Gly Leu Arg Cys Val Tyr Ser Glu Arg Leu Pro Lys Arg Asn Leu  
50 55 60

His Lys Glu Ala Ala Ala Gly Thr Thr Arg Ala Thr Glu Thr Ser Gln  
65 70 75 80

Pro Met Thr Ala Thr Ser Ser Thr Val Phe Ser Ser Leu Ala Glu Thr  
85 90 95

Pro Pro Pro Tyr Cys Ser Pro Pro Thr His Ile Gly Thr Ser Ala Leu  
100 105 110

Lys Glu Thr Leu Ser Glu Pro Ser Ala Ala Thr Leu Gln Phe Tyr Asp  
115 120 125

Thr Ser Ile Asn Phe Asp Asp Pro Glu Ser Phe Pro Gly Gly Trp Pro  
130 135 140

Gln Pro Asn Thr Phe Arg Asp Asp Ala Asn Ser Asn Glu Ser Ser Gly  
 145 150 155 160

Ile Pro Asp Leu Gly Tyr Asp Phe Glu Gly Pro Leu Asp Ala Thr Ala  
 165 170 175

Pro Val Ser Pro Ser Leu Phe Asp Leu Glu Val Glu Gly Asn Ser Ser  
 180 185 190

Ser Gly Gln Ser Asn Thr Ser Asn Thr Gln Arg Asp Leu Phe Glu Ser  
 195 200 205

Leu Ser Asp Val Ser Gln Asp Leu Glu Val Ile Leu His Gly Val Thr  
 210 215 220

Val Glu Trp Pro Lys Gln Lys Ile Leu Ser Tyr Pro Ile Gly Asp Phe  
 225 230 235 240

Leu Asn Ala Phe Gly Arg Leu Leu Leu His Leu Gln Glu Arg Val Ile  
 245 250 255

Thr Ser Ser Asn Ser Ser Met Leu Asp Gly Cys Leu Gln Thr Lys Asn  
 260 265 270

Leu Phe Met Ala Val His Cys Tyr Met Leu Ser Val Lys Ile Met Thr  
 275 280 285

Ser Leu Ser Gln Leu Leu Leu Ser Glu Val Met Lys Ala Gln Pro Cys  
 290 295 300

Gly Gln Lys Gln Ser Thr Arg Met Asp Trp Tyr Trp Ser Gly Ser Thr  
 305 310 315 320

Thr Arg Asn Asp Asn Gly Arg Ala Glu Ala Leu Pro Ser Phe His Ser  
 325 330 335

Asn Leu His Ile Gly Glu Leu Ile Ser His Leu Asp Pro Phe Met His  
 340 345 350



Ala Leu Ser Ser Ala Cys Thr Thr Leu Arg Val Ser Leu Arg Leu Leu  
           355                                  360                                  365

Ser Glu Ile Glu Thr Ala Leu Gly Ile Ala Gln Glu His Gly Ala Ala  
       370                                  375                                  380

Ala Ser Ile Arg Leu Val Leu Ser Asp Met Pro Ser Thr Ser Trp Gln  
   385                                  390                                  395                                  400

Ile Leu Gly Ala Glu Asn Lys Thr Ile Thr Pro Ala Ser Arg Leu Leu  
                                   405                                  410                                  415

Ser Val Leu Trp Ser Asp Glu Ala Gly Asp Glu Glu Pro Lys Ser Thr  
                                   420                                  425                                  430

Lys Ala Ser Gly Lys Thr Ile Asn Val Leu Arg Arg Cys Tyr Lys Glu  
                                   435                                  440                                  445

Ile Phe Ala Leu Ala Lys Lys His Asn Ile Ala  
       450                                  455

<210> 43

<211> 9099

<212> DNA

<213> Penicillium citrinum

<220>

<221> CDS

<222> (1)..(9099)

<400> 43

atg gat caa gcc aac tat cca aac gag cca att gtg gta gtg gga agc  
       48

Met Asp Gln Ala Asn Tyr Pro Asn Glu Pro Ile Val Val Val Gly Ser

1 5 10 15

ggt tgt cgg ttt cca ggt ggt gtc aac aca cca tca aaa ctt tgg gag

96

Gly Cys Arg Phe Pro Gly Gly Val Asn Thr Pro Ser Lys Leu Trp Glu

20 25 30

ctg ctc aaa gag ccc cgg gat gta cag acc aag atc cct aag gag aga

144

Leu Leu Lys Glu Pro Arg Asp Val Gln Thr Lys Ile Pro Lys Glu Arg

35 40 45

ttt gac gtc gat aca ttt tac agc ccc gat ggc act cac ccc ggg cgc

192

Phe Asp Val Asp Thr Phe Tyr Ser Pro Asp Gly Thr His Pro Gly Arg

50 55 60

acg aac gca ccc ttt gca tac ttg ctg cag gag gat cta cgc ggt ttt

240

Thr Asn Ala Pro Phe Ala Tyr Leu Leu Gln Glu Asp Leu Arg Gly Phe

65 70 75 80

gat gcc tct ttc ttc aac atc caa gct gga gag gcc gaa acg att gac

288

Asp Ala Ser Phe Phe Asn Ile Gln Ala Gly Glu Ala Glu Thr Ile Asp

85 90 95

cca cag caa agg ctg ctg ctg gag acg gtc tat gaa gct gta tcc aac

336

Pro Gln Gln Arg Leu Leu Leu Glu Thr Val Tyr Glu Ala Val Ser Asn

100 105 110

gca ggc cta cgg atc caa ggc ctt caa gga tcc tct act gct gtg tac

384

Ala Gly Leu Arg Ile Gln Gly Leu Gln Gly Ser Ser Thr Ala Val Tyr

115	120	125	
gtc ggt atg atg acg cat gac tat gag act atc gtg acg cgt gaa ttg 432 Val Gly Met Met Thr His Asp Tyr Glu Thr Ile Val Thr Arg Glu Leu			
130	135	140	
gat agt att cct aca tac tct gcc acg ggg gta gct gtc agt gtg gcc 480 Asp Ser Ile Pro Thr Tyr Ser Ala Thr Gly Val Ala Val Ser Val Ala			
145	150	155	160
tcc aac cgt gta tca tac ttc ttc gac tgg cat ggg ccg agt atg acg 528 Ser Asn Arg Val Ser Tyr Phe Phe Asp Trp His Gly Pro Ser Met Thr			
	165	170	175
atc gac aca gcc tgt agt tca tcc tta gct gcc gtg cat ctg gcc gtc 576 Ile Asp Thr Ala Cys Ser Ser Ser Leu Ala Ala Val His Leu Ala Val			
	180	185	190
caa cag ctt aga acg ggc gag agt acc atg gcg gtt gca gcc ggt gcg 624 Gln Gln Leu Arg Thr Gly Glu Ser Thr Met Ala Val Ala Ala Gly Ala			
195	200	205	
aat ctg ata ttg ggc ccc atg acc ttt gta atg gag agc aaa ttg aac 672 Asn Leu Ile Leu Gly Pro Met Thr Phe Val Met Glu Ser Lys Leu Asn			
210	215	220	
atg ctg tcc ccc aat ggt aga tct cga atg tgg gat gct gct gcc gat 720 Met Leu Ser Pro Asn Gly Arg Ser Arg Met Trp Asp Ala Ala Ala Asp			

225		230		235		240
gga tat gcc aga gga gaa ggt gtt tgc tct att gtc ctg aaa acg ctg						
768						
Gly Tyr Ala Arg Gly Glu Gly Val Cys Ser Ile Val Leu Lys Thr Leu						
		245		250		255
agc cag gca ctg cgc gac ggg gac agt atc gag tgt gtt atc cga gag						
816						
Ser Gln Ala Leu Arg Asp Gly Asp Ser Ile Glu Cys Val Ile Arg Glu						
	260		265		270	
acc ggt atc aac caa gat ggc cga acg aca ggt atc aca atg cca aac						
864						
Thr Gly Ile Asn Gln Asp Gly Arg Thr Thr Gly Ile Thr Met Pro Asn						
	275		280		285	
cat agc gca caa gaa gcc ctc att cgg gcc aca tat gcc aag gct ggt						
912						
His Ser Ala Gln Glu Ala Leu Ile Arg Ala Thr Tyr Ala Lys Ala Gly						
	290		295		300	
ctt gat att acc aac ccc cag gaa cgc tgc cag ttc ttt gaa gcc cat						
960						
Leu Asp Ile Thr Asn Pro Gln Glu Arg Cys Gln Phe Phe Glu Ala His						
305		310		315		320
gga act ggt aca cca gcc ggt gac cca cag gaa gct gag gct att gca						
1008						
Gly Thr Gly Thr Pro Ala Gly Asp Pro Gln Glu Ala Glu Ala Ile Ala						
		325		330		335
aca gcc ttc ttc gga cac aag gat gga aca atc gac agc gac ggc gag						
1056						
Thr Ala Phe Phe Gly His Lys Asp Gly Thr Ile Asp Ser Asp Gly Glu						
	340		345		350	

aaa gat gag ctt ttt gtc ggc agc atc aag aca gtt ctc ggt cac acg  
1104

Lys Asp Glu Leu Phe Val Gly Ser Ile Lys Thr Val Leu Gly His Thr

355

360

365

gaa ggc act gct ggt att gcg ggc tta atg aag gca tcg ttt gct gta  
1152

Glu Gly Thr Ala Gly Ile Ala Gly Leu Met Lys Ala Ser Phe Ala Val

370

375

380

cga aat ggc gtg atc ccg cca aac ctg ctg ttt gag aag atc agt ccc  
1200

Arg Asn Gly Val Ile Pro Pro Asn Leu Leu Phe Glu Lys Ile Ser Pro

385

390

395

400

cgt gtc gct ccg ttc tat acg cac ttg aaa att gca acg gag gcc aca  
1248

Arg Val Ala Pro Phe Tyr Thr His Leu Lys Ile Ala Thr Glu Ala Thr

405

410

415

gaa tgg ccg att gtt gcg ccc ggg cag cct cgc aga gtc agc gtt aat  
1296

Glu Trp Pro Ile Val Ala Pro Gly Gln Pro Arg Arg Val Ser Val Asn

420

425

430

tca ttt gga ttt ggt ggt aca aat gcc cat gct att atc gaa gag tat  
1344

Ser Phe Gly Phe Gly Gly Thr Asn Ala His Ala Ile Ile Glu Glu Tyr

435

440

445

atg gct cct cca cac aag ccg aca gca gtg gta aca gag gtg acc tca  
1392

Met Ala Pro Pro His Lys Pro Thr Ala Val Val Thr Glu Val Thr Ser

450

455

460

gat gca gat gca tgc agc ttg ccc ctt gtg ctt tca tcg aag tcg cag  
1440

Asp Ala Asp Ala Cys Ser Leu Pro Leu Val Leu Ser Ser Lys Ser Gln

465

470

475

480

cgc tcc atg aag gca acg cta gaa aat atg ctc caa ttt ctg gaa acg  
1488

Arg Ser Met Lys Ala Thr Leu Glu Asn Met Leu Gln Phe Leu Glu Thr

485

490

495

cat gat gac gtg gac atg cat gat atc gca tat acc tta ctt gag aaa  
1536

His Asp Asp Val Asp Met His Asp Ile Ala Tyr Thr Leu Leu Glu Lys

500

505

510

cgg tct atc ttg ccc ttc cgt cgt gcg att gca gca cac aac aag gaa  
1584

Arg Ser Ile Leu Pro Phe Arg Arg Ala Ile Ala Ala His Asn Lys Glu

515

520

525

gta gcc cgc gcg gca ctg gag gct gcc atc gcg gac ggt gag gtc gtc  
1632

Val Ala Arg Ala Ala Leu Glu Ala Ala Ile Ala Asp Gly Glu Val Val

530

535

540

acc gac ttc cgc acc gac gcg aat gac aac cct cgc gta cta ggt gtc  
1680

Thr Asp Phe Arg Thr Asp Ala Asn Asp Asn Pro Arg Val Leu Gly Val

545

550

555

560

ttt act ggc caa ggt gca cag tgg ccg ggc atg ctg aag aag ctc atg  
1728

Phe Thr Gly Gln Gly Ala Gln Trp Pro Gly Met Leu Lys Lys Leu Met

565

570

575

gtg ggt atg cca ttt gtg aga ggc att ctc gaa gag ctg gat aat tca



1776

Val Gly Met Pro Phe Val Arg Gly Ile Leu Glu Glu Leu Asp Asn Ser

580

585

590

ctg caa aca ctg cct gaa aag tat cgg cct acg tgg aca ctg tat gac

1824

Leu Gln Thr Leu Pro Glu Lys Tyr Arg Pro Thr Trp Thr Leu Tyr Asp

595

600

605

cag ctc atg ctt gaa ggg gat gcc tca aac gtc aga ctc gcc agc ttc

1872

Gln Leu Met Leu Glu Gly Asp Ala Ser Asn Val Arg Leu Ala Ser Phe

610

615

620

tcc cag cct cta tgc tgc gcc gta caa atc gtt ctg gtc cga ctt ctc

1920

Ser Gln Pro Leu Cys Cys Ala Val Gln Ile Val Leu Val Arg Leu Leu

625

630

635

640

gct gca gct ggt atc gag ttc agt gca att gtc ggc cac agt tca ggt

1968

Ala Ala Ala Gly Ile Glu Phe Ser Ala Ile Val Gly His Ser Ser Gly

645

650

655

gag att gcc tgt gcc ttt gcg gca gga ttc atc agt gcc act caa gct

2016

Glu Ile Ala Cys Ala Phe Ala Ala Gly Phe Ile Ser Ala Thr Gln Ala

660

665

670

atc cgt att gcg cat ctg cgt gga gtt gtg tcc gcg gag cat gcc tct

2064

Ile Arg Ile Ala His Leu Arg Gly Val Val Ser Ala Glu His Ala Ser

675

680

685

tct cca agc ggc cag aca ggc gct atg cta gcg gca ggt atg tcg tac

2112

Ser Pro Ser Gly Gln Thr Gly Ala Met Leu Ala Ala Gly Met Ser Tyr  
 690 695 700

gat gac gca aag gaa cta tgc gag ctc gaa gcc ttt gag ggt cgg gtc  
 2160  
 Asp Asp Ala Lys Glu Leu Cys Glu Leu Glu Ala Phe Glu Gly Arg Val  
 705 710 715 720

tgc gtc gcc gct agc aat tca ccg gat agt gtg acc ttc tcc ggc gac  
 2208  
 Cys Val Ala Ala Ser Asn Ser Pro Asp Ser Val Thr Phe Ser Gly Asp  
 725 730 735

atg gat gct atc cag cac gtt gaa ggt gtc ttg gag gat gaa tcc act  
 2256  
 Met Asp Ala Ile Gln His Val Glu Gly Val Leu Glu Asp Glu Ser Thr  
 740 745 750

ttt gcc aga atc ttg aga gtt gac aag gcc tac cat tcg cat cac atg  
 2304  
 Phe Ala Arg Ile Leu Arg Val Asp Lys Ala Tyr His Ser His His Met  
 755 760 765

cac cca tgc gca gct cca tat gtc aag gca ttg ctg gag tgc gac tgt  
 2352  
 His Pro Cys Ala Ala Pro Tyr Val Lys Ala Leu Leu Glu Cys Asp Cys  
 770 775 780

gct gtt gcc gat ggc caa ggt aac gat agt gtt gct tgg ttc tct gcc  
 2400  
 Ala Val Ala Asp Gly Gln Gly Asn Asp Ser Val Ala Trp Phe Ser Ala  
 785 790 795 800

gtc cac gag acc agc aag caa atg act gta cag gat gtg atg ccc gct  
 2448  
 Val His Glu Thr Ser Lys Gln Met Thr Val Gln Asp Val Met Pro Ala

805	810	815
tat tgg aaa gac aat ctc gtc tct ccg gtc ttg ttc tcg cag gct gtg 2496		
Tyr Trp Lys Asp Asn Leu Val Ser Pro Val Leu Phe Ser Gln Ala Val		
820	825	830
cag aaa gca gtc atc act cat cgt cta atc gac gtc gcc atc gaa att 2544		
Gln Lys Ala Val Ile Thr His Arg Leu Ile Asp Val Ala Ile Glu Ile		
835	840	845
ggc gcc cac cct gct ctc aag ggt ccg tgt cta gcc acc atc aag gat 2592		
Gly Ala His Pro Ala Leu Lys Gly Pro Cys Leu Ala Thr Ile Lys Asp		
850	855	860
gct ctt gcc ggt gtg gag ctg ccg tat acc ggg tgc ttg gca cga aac 2640		
Ala Leu Ala Gly Val Glu Leu Pro Tyr Thr Gly Cys Leu Ala Arg Asn		
865	870	875
ggt gac gat gtg gac gct ttt gct gga ggt ctg gga tac att tgg gag 2688		
Val Asp Asp Val Asp Ala Phe Ala Gly Gly Leu Gly Tyr Ile Trp Glu		
885	890	895
cgt ttc gga gtt cgg agt atc gac gcc gag ggc ttc gta caa caa gtc 2736		
Arg Phe Gly Val Arg Ser Ile Asp Ala Glu Gly Phe Val Gln Gln Val		
900	905	910
cgg ccc gat cgt gcc gtt caa aac ctg tca aag tca ttg ccc aca tac 2784		
Arg Pro Asp Arg Ala Val Gln Asn Leu Ser Lys Ser Leu Pro Thr Tyr		

915	920	925
tct tgg gat cat act cgt caa tac tgg gca gaa tct cgc tcc acc cgc		
2832		
Ser Trp Asp His Thr Arg Gln Tyr Trp Ala Glu Ser Arg Ser Thr Arg		
930	935	940
cag cat ctt cgt gga ggt gcg ccc cat ctt ctg ctt gga aag ctt tct		
2880		
Gln His Leu Arg Gly Gly Ala Pro His Leu Leu Leu Gly Lys Leu Ser		
945	950	955
tct tac agc aca gca tcg acc ttc cag tgg aca aac ttc atc agg ccc		
2928		
Ser Tyr Ser Thr Ala Ser Thr Phe Gln Trp Thr Asn Phe Ile Arg Pro		
965	970	975
cgg gat ctg gaa tgg ctc gac ggt cat gcg cta caa ggc cag act gtg		
2976		
Arg Asp Leu Glu Trp Leu Asp Gly His Ala Leu Gln Gly Gln Thr Val		
980	985	990
ttc ccc gct gct ggg tac ata att atg gcc atg gaa gct gcc atg aag		
3024		
Phe Pro Ala Ala Gly Tyr Ile Ile Met Ala Met Glu Ala Ala Met Lys		
995	1000	1005
gtg gct ggt gag cgt gcc gcc caa gtt cag ctc ctg gaa atc ttg		
3069		
Val Ala Gly Glu Arg Ala Ala Gln Val Gln Leu Leu Glu Ile Leu		
1010	1015	1020
gac atg agc atc aac aaa gcc atc gtg ttt gaa gat gaa aac acc		
3114		
Asp Met Ser Ile Asn Lys Ala Ile Val Phe Glu Asp Glu Asn Thr		
1025	1030	1035

tcc gtg gag ctg aac ttg aca gcc gaa gtc acc agt gac aat gat  
3159

Ser Val Glu Leu Asn Leu Thr Ala Glu Val Thr Ser Asp Asn Asp

1040

1045

1050

gcg gat ggc caa gtc acg gtc aaa ttt gtt att gat tcc tgt ctg  
3204

Ala Asp Gly Gln Val Thr Val Lys Phe Val Ile Asp Ser Cys Leu

1055

1060

1065

gca aag gag agt gag ctt tcg aca tcc gcc aaa ggc caa atc gtc  
3249

Ala Lys Glu Ser Glu Leu Ser Thr Ser Ala Lys Gly Gln Ile Val

1070

1075

1080

ata acc ctt ggc gag gca tca ccg tca tcg cag ctt ttg ccg cca  
3294

Ile Thr Leu Gly Glu Ala Ser Pro Ser Ser Gln Leu Leu Pro Pro

1085

1090

1095

cct gag gaa gag tac ccc cag atg aac aat gtc aac atc gat ttc  
3339

Pro Glu Glu Glu Tyr Pro Gln Met Asn Asn Val Asn Ile Asp Phe

1100

1105

1110

ttc tat cgg gaa ctt gac ctc ctt ggg tat gac tac agc aaa gac  
3384

Phe Tyr Arg Glu Leu Asp Leu Leu Gly Tyr Asp Tyr Ser Lys Asp

1115

1120

1125

ttc cgt cgt ttg cag acc atg aga agg gcc gac tcc aaa gct agc  
3429

Phe Arg Arg Leu Gln Thr Met Arg Arg Ala Asp Ser Lys Ala Ser

1130

1135

1140

ggc acc ttg gct ttc ctt cca ctt aag gat gaa ttg cgc aat gag  
 3474  
 Gly Thr Leu Ala Phe Leu Pro Leu Lys Asp Glu Leu Arg Asn Glu

1145

1150

1155

ccc ctc ttg ctc cac cca gcg ccc ctg gac atc gcg ttc cag act  
 3519  
 Pro Leu Leu Leu His Pro Ala Pro Leu Asp Ile Ala Phe Gln Thr

1160

1165

1170

gtc att gga gcg tat tcc tct cca gga gat cgt cgc cta cgc tca  
 3564  
 Val Ile Gly Ala Tyr Ser Ser Pro Gly Asp Arg Arg Leu Arg Ser

1175

1180

1185

ttg tac gtg cct act cac gtt gac aga gtg act ctg att cca tcg  
 3609  
 Leu Tyr Val Pro Thr His Val Asp Arg Val Thr Leu Ile Pro Ser

1190

1195

1200

ctc tgt ata tcg gcg ggt aat tct ggt gaa acc gag ctt gcg ttt  
 3654  
 Leu Cys Ile Ser Ala Gly Asn Ser Gly Glu Thr Glu Leu Ala Phe

1205

1210

1215

gac aca atc aac aca cac gac aag ggt gat ttc ctg agc ggc gac  
 3699  
 Asp Thr Ile Asn Thr His Asp Lys Gly Asp Phe Leu Ser Gly Asp

1220

1225

1230

atc acg gtg tac gat tcg acc aag aca acg ctt ttc caa gtt gat  
 3744  
 Ile Thr Val Tyr Asp Ser Thr Lys Thr Thr Leu Phe Gln Val Asp

1235

1240

1245

aac att gtc ttt aag cct ttc tct ccc ccg act gct tcg acc gac



3789

Asn Ile Val Phe Lys Pro Phe Ser Pro Pro Thr Ala Ser Thr Asp

1250

1255

1260

cac cga atc ttc gca aag tgg gtc tgg gga ccc ctc acg ccc gaa

3834

His Arg Ile Phe Ala Lys Trp Val Trp Gly Pro Leu Thr Pro Glu

1265

1270

1275

aaa ctg ctg gag gac cct gcg acg ttg atc ata gct cgg gac aag

3879

Lys Leu Leu Glu Asp Pro Ala Thr Leu Ile Ile Ala Arg Asp Lys

1280

1285

1290

gag gac att ctg acc atc gag cga atc gtt tac ttc tac atc aaa

3924

Glu Asp Ile Leu Thr Ile Glu Arg Ile Val Tyr Phe Tyr Ile Lys

1295

1300

1305

tcc ttc cta gcc cag ata acc ccc gac gac cgt caa aat gcc gac

3969

Ser Phe Leu Ala Gln Ile Thr Pro Asp Asp Arg Gln Asn Ala Asp

1310

1315

1320

ctc cat tcc cag aag tac att gaa tgg tgt gac cag gtt cag gcc

4014

Leu His Ser Gln Lys Tyr Ile Glu Trp Cys Asp Gln Val Gln Ala

1325

1330

1335

gat gct cgg gct ggc cac cat cag tgg tac cag gag tct tgg gag

4059

Asp Ala Arg Ala Gly His His Gln Trp Tyr Gln Glu Ser Trp Glu

1340

1345

1350

gag gac act tct gtt cac att gag caa atg tgt gaa agc aac tcg

4104

Glu Asp	Thr Ser	Val His	Ile	Glu Gln	Met Cys	Glu	Ser Asn	Ser
1355			1360			1365		

tcc cac	cca cat	gtg cgc	ctg	atc caa	agg gta	ggc	aaa gaa	tta
4149								
Ser His	Pro His	Val Arg	Leu	Ile Gln	Arg Val	Gly	Lys Glu	Leu
1370			1375			1380		

att tca	att gtt	cgc ggg	aac	ggg gat	cct ttg	gat	atc atg	aac
4194								
Ile Ser	Ile Val	Arg Gly	Asn	Gly Asp	Pro Leu	Asp	Ile Met	Asn
1385			1390			1395		

cgc gat	ggg ttg	ttc acc	gag	tac tat	acc aac	aag	ctc gcc	ttt
4239								
Arg Asp	Gly Leu	Phe Thr	Glu	Tyr Tyr	Thr Asn	Lys	Leu Ala	Phe
1400			1405			1410		

ggc tca	gca ata	cac gtc	gtt	cag gat	ctg gtt	agc	caa att	gct
4284								
Gly Ser	Ala Ile	His Val	Val	Gln Asp	Leu Val	Ser	Gln Ile	Ala
1415			1420			1425		

cat cgc	tac caa	tcc att	gat	atc ctt	gag atc	ggc	ttg ggt	aca
4329								
His Arg	Tyr Gln	Ser Ile	Asp	Ile Leu	Glu Ile	Gly	Leu Gly	Thr
1430			1435			1440		

ggc atc	gcc acg	aag cgc	gtt	ctt gca	tca cct	caa	ctt ggt	ttc
4374								
Gly Ile	Ala Thr	Lys Arg	Val	Leu Ala	Ser Pro	Gln	Leu Gly	Phe
1445			1450			1455		

aac agt	tac act	tgc act	gac	atc tcg	gcg gat	gtt	att ggc	aag
4419								
Asn Ser	Tyr Thr	Cys Thr	Asp	Ile Ser	Ala Asp	Val	Ile Gly	Lys

1460	1465	1470
gcc cgt 4464	gaa caa ctt tcc gaa	ttc gac ggt ctc atg cag ttt gag
Ala Arg	Glu Gln Leu Ser Glu	Phe Asp Gly Leu Met Gln Phe Glu
1475	1480	1485
gca cta 4509	gac atc aac aga agc	cca gca gag caa gga ttc aag cct
Ala Leu	Asp Ile Asn Arg Ser	Pro Ala Glu Gln Gly Phe Lys Pro
1490	1495	1500
cac tcc 4554	tac gat ctg att att	gca tcc gat gtc ctc cat gcc agc
His Ser	Tyr Asp Leu Ile Ile	Ala Ser Asp Val Leu His Ala Ser
1505	1510	1515
tcc aac 4599	ttc gag gaa aaa ttg	gct cac ata agg tcc ttg ctc aag
Ser Asn	Phe Glu Glu Lys Leu	Ala His Ile Arg Ser Leu Leu Lys
1520	1525	1530
ccg ggt 4644	ggt cac ttg gtt act	ttc ggg gtc acc cat cgc gag cct
Pro Gly	Gly His Leu Val Thr	Phe Gly Val Thr His Arg Glu Pro
1535	1540	1545
gct cgc 4689	ctc gcc ttc atc tct	ggg ctt ttc gct gat cga tgg act
Ala Arg	Leu Ala Phe Ile Ser	Gly Leu Phe Ala Asp Arg Trp Thr
1550	1555	1560
gga gaa 4734	gac gaa act cgt gct	ttg agt gcc tcg ggg tcc gtt gac
Gly Glu	Asp Glu Thr Arg Ala	Leu Ser Ala Ser Gly Ser Val Asp

1565	1570	1575
caa tgg	gag cat acc ctc aag	aga gtt ggg ttc tct
4779		ggc gtc gat
Gln Trp	Glu His Thr Leu Lys	Arg Val Gly Phe Ser
		Gly Val Asp
1580	1585	1590
agt cgg	aca ctt gat cga gag	gat gat ttg atc ccg
4824		tct gtc ttc
Ser Arg	Thr Leu Asp Arg Glu	Asp Asp Leu Ile Pro
		Ser Val Phe
1595	1600	1605
agt aca	cat gct gtg gat gcc	acc gtt gag cgt ttg
4869		tat gat cca
Ser Thr	His Ala Val Asp Ala	Thr Val Glu Arg Leu
		Tyr Asp Pro
1610	1615	1620
ctt tct	gct cca ttg aag gac	tca tac ccg cca tta
4914		gtg gtt atc
Leu Ser	Ala Pro Leu Lys Asp	Ser Tyr Pro Pro Leu
		Val Val Ile
1625	1630	1635
ggg ggc	gaa tcg aca aaa acc	gaa cgc att ttg aac
4959		gac atg aaa
Gly Gly	Glu Ser Thr Lys Thr	Glu Arg Ile Leu Asn
		Asp Met Lys
1640	1645	1650
gct gcc	cta ccg cat aga cac	atc cac tcc gtc aag
5004		cgg ctg gaa
Ala Ala	Leu Pro His Arg His	Ile His Ser Val Lys
		Arg Leu Glu
1655	1660	1665
agt gtt	ctc gac gac ccg gcc	ttg cag cct aag tcg
5049		act ttt gtc
Ser Val	Leu Asp Asp Pro Ala	Leu Gln Pro Lys Ser
		Thr Phe Val
1670	1675	1680

atc ctc tcg gaa ctt gat gat gaa gtg ttt tgc aac ctt gaa gag  
5094

Ile Leu Ser Glu Leu Asp Asp Glu Val Phe Cys Asn Leu Glu Glu

1685

1690

1695

gac aag ttt gag gca gtc aag tct ctt ctc ttc tac gcc gga cgc  
5139

Asp Lys Phe Glu Ala Val Lys Ser Leu Leu Phe Tyr Ala Gly Arg

1700

1705

1710

atg atg tgg ctg aca gag aat gcc tgg att gat cat ccc cac cag  
5184

Met Met Trp Leu Thr Glu Asn Ala Trp Ile Asp His Pro His Gln

1715

1720

1725

gcc agc acc atc gga atg ttg agg aca atc aag ctc gag aac cct  
5229

Ala Ser Thr Ile Gly Met Leu Arg Thr Ile Lys Leu Glu Asn Pro

1730

1735

1740

gac ttg gga acg cac gtc ttc gat gtc gat act gtg gag aac cta  
5274

Asp Leu Gly Thr His Val Phe Asp Val Asp Thr Val Glu Asn Leu

1745

1750

1755

gac acc aaa ttc ttc gtt gag caa ctt ttg cgc ttc gag gag agc  
5319

Asp Thr Lys Phe Phe Val Glu Gln Leu Leu Arg Phe Glu Glu Ser

1760

1765

1770

gat gat cag ctt ttg gaa tca ata aca tgg act cat gag ccc gaa  
5364

Asp Asp Gln Leu Leu Glu Ser Ile Thr Trp Thr His Glu Pro Glu

1775

1780

1785

gtg tac tgg tgc aag ggt cgt gcc tgg gtc cct cgt ttg aag cag  
 5409  
 Val Tyr Trp Cys Lys Gly Arg Ala Trp Val Pro Arg Leu Lys Gln  
 1790 1795 1800

gat att gct agg aac gac cgt atg aac tcg tct cgt cgt cca att  
 5454  
 Asp Ile Ala Arg Asn Asp Arg Met Asn Ser Ser Arg Arg Pro Ile  
 1805 1810 1815

ttc ggt aac ttt aat tcg tcc aag acg gcc att gca ctg aaa gag  
 5499  
 Phe Gly Asn Phe Asn Ser Ser Lys Thr Ala Ile Ala Leu Lys Glu  
 1820 1825 1830

gcg agg gga gca tcc tca tcg atg tac tat ctt gag tca acc gag  
 5544  
 Ala Arg Gly Ala Ser Ser Ser Met Tyr Tyr Leu Glu Ser Thr Glu  
 1835 1840 1845

acg tgt gat tcg tta gaa gac gct cgt cat gct gga aaa gca act  
 5589  
 Thr Cys Asp Ser Leu Glu Asp Ala Arg His Ala Gly Lys Ala Thr  
 1850 1855 1860

gtt cgt gtt cgc tac gct ctt ccc cag gca att cgc gtg ggc cat  
 5634  
 Val Arg Val Arg Tyr Ala Leu Pro Gln Ala Ile Arg Val Gly His  
 1865 1870 1875

ctc gga tac ttc cat gtc gtg cag ggc agt att ctg gag aat aca  
 5679  
 Leu Gly Tyr Phe His Val Val Gln Gly Ser Ile Leu Glu Asn Thr  
 1880 1885 1890

tgt gag gtg cct gta gtc gcc ctg gct gag aag aat gga tct ata



5724  
 Cys Glu Val Pro Val Val Ala Leu Ala Glu Lys Asn Gly Ser Ile  
 1895 1900 1905  
 ctg cat gta ccg aga aac tac atg cat agt ctg ccc gat aac atg  
 5769  
 Leu His Val Pro Arg Asn Tyr Met His Ser Leu Pro Asp Asn Met  
 1910 1915 1920  
 gcg gaa ggc gag gat agt tcc ttc ttg ttg tcc aca gct gca gcc  
 5814  
 Ala Glu Gly Glu Asp Ser Ser Phe Leu Leu Ser Thr Ala Ala Ala  
 1925 1930 1935  
 ctc ctt gcc gaa aca att ctc tct agc gct cag tcc ttt ggc tct  
 5859  
 Leu Leu Ala Glu Thr Ile Leu Ser Ser Ala Gln Ser Phe Gly Ser  
 1940 1945 1950  
 gat gca tca att ctg att atg gag ccc cca atc ttc tgc gtc aaa  
 5904  
 Asp Ala Ser Ile Leu Ile Met Glu Pro Pro Ile Phe Cys Val Lys  
 1955 1960 1965  
 gca att ctg gag tcg gcc aaa acc tac ggt gtt cag gtt cat ttg  
 5949  
 Ala Ile Leu Glu Ser Ala Lys Thr Tyr Gly Val Gln Val His Leu  
 1970 1975 1980  
 gca aca act ctg tcc gac gtc aaa act att ccg gct cct tgg atc  
 5994  
 Ala Thr Thr Leu Ser Asp Val Lys Thr Ile Pro Ala Pro Trp Ile  
 1985 1990 1995  
 cga tta cat gcc aag gaa acc gac gct cgg ctg aaa cac agc ctg  
 6039

Arg	Leu	His	Ala	Lys	Glu	Thr	Asp	Ala	Arg	Leu	Lys	His	Ser	Leu
2000				2005				2010						

ccg	aca	aac	atg	atg	gca	ttc	ttt	gac	ttg	tct	acc	gac	cgg	act
6084														
Pro	Thr	Asn	Met	Met	Ala	Phe	Phe	Asp	Leu	Ser	Thr	Asp	Arg	Thr
2015				2020				2025						

gct	gcc	ggg	ata	acc	aac	cgt	ttg	gcc	aag	ttg	cta	cca	ccc	agt
6129														
Ala	Ala	Gly	Ile	Thr	Asn	Arg	Leu	Ala	Lys	Leu	Leu	Pro	Pro	Ser
2030				2035				2040						

tgc	ttc	atg	tac	agt	ggt	gac	tat	ctt	atc	cga	agt	aca	gct	tcc
6174														
Cys	Phe	Met	Tyr	Ser	Gly	Asp	Tyr	Leu	Ile	Arg	Ser	Thr	Ala	Ser
2045				2050				2055						

aca	tac	aaa	gtt	agt	cat	gtt	gag	gat	att	cca	atc	ctc	gag	cac
6219														
Thr	Tyr	Lys	Val	Ser	His	Val	Glu	Asp	Ile	Pro	Ile	Leu	Glu	His
2060				2065				2070						

tct	gtg	gca	atg	gca	aaa	aat	acc	gtc	tct	gcg	tcg	act	gtc	gac
6264														
Ser	Val	Ala	Met	Ala	Lys	Asn	Thr	Val	Ser	Ala	Ser	Thr	Val	Asp
2075				2080				2085						

gac	act	gag	aaa	gtt	att	aca	gcc	aca	caa	att	ctc	ttg	cct	ggt
6309														
Asp	Thr	Glu	Lys	Val	Ile	Thr	Ala	Thr	Gln	Ile	Leu	Leu	Pro	Gly
2090				2095				2100						

cag	ctc	tct	gtc	aac	cac	aat	gac	caa	cgc	ttc	aat	ctg	gcc	acc
6354														
Gln	Leu	Ser	Val	Asn	His	Asn	Asp	Gln	Arg	Phe	Asn	Leu	Ala	Thr

2105

2110

2115

gtc atc gac tgg aag gaa aat gag gtg tcc gct agg att tgc ccc  
6399

Val Ile Asp Trp Lys Glu Asn Glu Val Ser Ala Arg Ile Cys Pro

2120

2125

2130

atc gac tct ggt aac tta ttt tcc aac aag aag acg tat ttg ctt  
6444

Ile Asp Ser Gly Asn Leu Phe Ser Asn Lys Lys Thr Tyr Leu Leu

2135

2140

2145

gtt ggt ctt acc ggg gac ctt ggt cgc tct ctc tgt cgc tgg atg  
6489

Val Gly Leu Thr Gly Asp Leu Gly Arg Ser Leu Cys Arg Trp Met

2150

2155

2160

atc ttg cat ggc gcc cgc cat gtt gtg ctc act agc cgg aac cct  
6534

Ile Leu His Gly Ala Arg His Val Val Leu Thr Ser Arg Asn Pro

2165

2170

2175

cga ctt gat ccc aaa tgg atc gcc aac atg gag gca ctt ggt ggt  
6579

Arg Leu Asp Pro Lys Trp Ile Ala Asn Met Glu Ala Leu Gly Gly

2180

2185

2190

gac atc acc gtt ctg tca atg gat gtt gcc aat gag gat tca gtc  
6624

Asp Ile Thr Val Leu Ser Met Asp Val Ala Asn Glu Asp Ser Val

2195

2200

2205

gat gct ggc ctt ggc aag ctt gtc gat atg aag ttg cca cct gtt  
6669

Asp Ala Gly Leu Gly Lys Leu Val Asp Met Lys Leu Pro Pro Val

2210	2215	2220
gcc ggc 6714 Ala Gly	atc gcg ttc ggg cct Ile Ala Phe Gly Pro	ttg gtg ctg cag gat Leu Val Leu Gln Asp
gtc atg ctg Val Met Leu		
2225	2230	2235
aag aac 6759 Lys Asn	atg gac cac cag atg Met Asp His Gln Met	atg gac atg gtg ttg Met Asp Met Val Leu
aag ccc aag Lys Pro Lys		
2240	2245	2250
gta caa 6804 Val Gln	gga gca cgc att ctt Gly Ala Arg Ile Leu	cat gaa cgg ttc tcc His Glu Arg Phe Ser
gaa cag acg Glu Gln Thr		
2255	2260	2265
ggc agc 6849 Gly Ser	aag gcg ctc gac ttc Lys Ala Leu Asp Phe	ttc atc atg ttt tcg Phe Ile Met Phe Ser
tcc att gtt Ser Ile Val		
2270	2275	2280
gca gtt 6894 Ala Val	att ggc aat cct ggc Ile Gly Asn Pro Gly	cag tcc aac tat ggc Gln Ser Asn Tyr Gly
gct gcg aat Ala Ala Asn		
2285	2290	2295
gcc tac 6939 Ala Tyr	cta cag gct ctg gcc Leu Gln Ala Leu Ala	cag caa cgg tgc gcc Gln Gln Arg Cys Ala
aga gga ttg Arg Gly Leu		
2300	2305	2310
gcg gga 6984 Ala Gly	tca acc atc gat att Ser Thr Ile Asp Ile	ggg gcc gtt tac ggt Gly Ala Val Tyr Gly
gta ggg ttt Val Gly Phe		
2315	2320	2325

gtc acg agg gcc gag atg gag gag gac ttt gat gct atc cgt ttc  
7029

Val Thr Arg Ala Glu Met Glu Glu Asp Phe Asp Ala Ile Arg Phe

2330

2335

2340

atg ttt gac tca gtt gaa gag cat gag ctg cac acg ctt ttc gcc  
7074

Met Phe Asp Ser Val Glu Glu His Glu Leu His Thr Leu Phe Ala

2345

2350

2355

gaa gcg gtc gtg tct gac cag cgt gcc cgg cag caa cca cag cgc  
7119

Glu Ala Val Val Ser Asp Gln Arg Ala Arg Gln Gln Pro Gln Arg

2360

2365

2370

aag acg gtc att gac atg gcg gac ctt gag ctt acc acg ggt atc  
7164

Lys Thr Val Ile Asp Met Ala Asp Leu Glu Leu Thr Thr Gly Ile

2375

2380

2385

cca gat ctt gac cct gcg ctt caa gat cga att att tac ttc aac  
7209

Pro Asp Leu Asp Pro Ala Leu Gln Asp Arg Ile Ile Tyr Phe Asn

2390

2395

2400

gac cct cgt ttc gga aac ttc aaa att ccc ggt caa cgc gga gac  
7254

Asp Pro Arg Phe Gly Asn Phe Lys Ile Pro Gly Gln Arg Gly Asp

2405

2410

2415

ggt ggc gac aat gga tca ggg tct aaa ggc tcc att gcc gac cag  
7299

Gly Gly Asp Asn Gly Ser Gly Ser Lys Gly Ser Ile Ala Asp Gln

2420

2425

2430

ctc aaa caa gca aca act tta gac caa gtt cgg caa atc gtg att  
 7344  
 Leu Lys Gln Ala Thr Thr Leu Asp Gln Val Arg Gln Ile Val Ile

2435

2440

2445

gat ggt cta tct gag aaa ctc cgt gtt acc ctc caa gtt tcg gac  
 7389  
 Asp Gly Leu Ser Glu Lys Leu Arg Val Thr Leu Gln Val Ser Asp

2450

2455

2460

ggg gag agc gtg gac cca acc att cct ctc att gat caa ggt gtc  
 7434  
 Gly Glu Ser Val Asp Pro Thr Ile Pro Leu Ile Asp Gln Gly Val

2465

2470

2475

gac tcc ttg ggt gca gtg act gtc ggc tca tgg ttc tca aag caa  
 7479  
 Asp Ser Leu Gly Ala Val Thr Val Gly Ser Trp Phe Ser Lys Gln

2480

2485

2490

ctc tac ctt gac ctc cca ctc ttg agg gta ctt ggc ggt gct tct  
 7524  
 Leu Tyr Leu Asp Leu Pro Leu Leu Arg Val Leu Gly Gly Ala Ser

2495

2500

2505

gtc gct gat ctt gcc gac gac gcg gcc acc cga ctc cca gct aca  
 7569  
 Val Ala Asp Leu Ala Asp Asp Ala Ala Thr Arg Leu Pro Ala Thr

2510

2515

2520

tcc att ccg ctg ctg ttg caa att ggt gat tcc acg gga acc tcg  
 7614  
 Ser Ile Pro Leu Leu Leu Gln Ile Gly Asp Ser Thr Gly Thr Ser

2525

2530

2535

gac agc ggg gct tct ccg aca cca aca gac agc cat gat gaa gca



7659  
 Asp Ser Gly Ala Ser Pro Thr Pro Thr Asp Ser His Asp Glu Ala  
 2540 2545 2550  
 agc tct gct acc agc aca gat gcg tcg tca gcc gaa gag gat gaa  
 7704  
 Ser Ser Ala Thr Ser Thr Asp Ala Ser Ser Ala Glu Glu Asp Glu  
 2555 2560 2565  
 gag caa gag gac gat aat gag cag gga ggc cgt aag att ctt cgt  
 7749  
 Glu Gln Glu Asp Asp Asn Glu Gln Gly Gly Arg Lys Ile Leu Arg  
 2570 2575 2580  
 cgc gag agg ttg tcc ctt ggc cag gag tat tcc tgg agg cag caa  
 7794  
 Arg Glu Arg Leu Ser Leu Gly Gln Glu Tyr Ser Trp Arg Gln Gln  
 2585 2590 2595  
 caa atg gta aaa gat cat acc atc ttc aac aac act att ggc atg  
 7839  
 Gln Met Val Lys Asp His Thr Ile Phe Asn Asn Thr Ile Gly Met  
 2600 2605 2610  
 ttc atg aag ggt acc att gac ctc gac cgg ttg agg cgg gct ctg  
 7884  
 Phe Met Lys Gly Thr Ile Asp Leu Asp Arg Leu Arg Arg Ala Leu  
 2615 2620 2625  
 aaa gcc tca ttg cgc cgt cac gag atc ttc cgt acg tgc ttt gtt  
 7929  
 Lys Ala Ser Leu Arg Arg His Glu Ile Phe Arg Thr Cys Phe Val  
 2630 2635 2640  
 act ggc gat gac tat agc agc gat tta aat ggt ccc gtc caa gtg  
 7974

Thr	Gly	Asp	Asp	Tyr	Ser	Ser	Asp	Leu	Asn	Gly	Pro	Val	Gln	Val
2645							2650					2655		

ggt ctc	aag	aac	ccg	gag	aac	aga	gtg	cac	ttt	ggt	cag	gtg	aac	
8019														
Val	Leu	Lys	Asn	Pro	Glu	Asn	Arg	Val	His	Phe	Val	Gln	Val	Asn
2660							2665					2670		

aac gct	gcg	gag	gca	gag	gaa	gag	tac	cgg	aaa	ctc	gag	aag	aca	
8064														
Asn	Ala	Ala	Glu	Ala	Glu	Glu	Glu	Tyr	Arg	Lys	Leu	Glu	Lys	Thr
2675							2680					2685		

aac tat	agc	atc	tcc	aca	ggt	gac	act	ctc	aga	ctc	ggt	gat	ttc	
8109														
Asn	Tyr	Ser	Ile	Ser	Thr	Gly	Asp	Thr	Leu	Arg	Leu	Val	Asp	Phe
2690							2695					2700		

tac tgg	ggc	aca	gat	gac	cac	ctg	ttg	gta	atc	ggc	tac	cac	aga	
8154														
Tyr	Trp	Gly	Thr	Asp	Asp	His	Leu	Leu	Val	Ile	Gly	Tyr	His	Arg
2705							2710					2715		

tta gtt	ggt	gat	ggc	tca	aca	aca	gaa	aac	ctg	ttc	aat	gag	atc	
8199														
Leu	Val	Gly	Asp	Gly	Ser	Thr	Thr	Glu	Asn	Leu	Phe	Asn	Glu	Ile
2720							2725					2730		

ggg cag	att	tac	agc	ggg	gtg	aaa	atg	cag	cga	cca	tcg	acc	caa	
8244														
Gly	Gln	Ile	Tyr	Ser	Gly	Val	Lys	Met	Gln	Arg	Pro	Ser	Thr	Gln
2735							2740					2745		

ttc tct	gat	cta	gcc	gtc	caa	cag	cgg	gaa	aac	ctg	gaa	aat	ggg	
8289														
Phe	Ser	Asp	Leu	Ala	Val	Gln	Gln	Arg	Glu	Asn	Leu	Glu	Asn	Gly

2750	2755	2760
cga atg 8334	ggg gac gat atc gcg	ttc tgg aag tcc atg cat agc aaa
Arg Met	Gly Asp Asp Ile Ala	Phe Trp Lys Ser Met His Ser Lys
2765	2770	2775
gtc tcg 8379	tca tct gcg cca acc	gtg ctt ccc atc atg aat ctg atc
Val Ser	Ser Ser Ala Pro Thr	Val Leu Pro Ile Met Asn Leu Ile
2780	2785	2790
aat gac 8424	cct gct gcc aat tca	gag cag cag caa ata cag cca ttc
Asn Asp	Pro Ala Ala Asn Ser	Glu Gln Gln Gln Ile Gln Pro Phe
2795	2800	2805
acg tgg 8469	cag cag tat gaa gca	att gct cgt tta gat ccc atg gtc
Thr Trp	Gln Gln Tyr Glu Ala	Ile Ala Arg Leu Asp Pro Met Val
2810	2815	2820
gcc ttc 8514	cga atc aaa gag cgg	agc cgc aag cac aag gca acc ccc
Ala Phe	Arg Ile Lys Glu Arg	Ser Arg Lys His Lys Ala Thr Pro
2825	2830	2835
atg cag 8559	ttc tac ctg gcc gcc	tac cac gtt ttg ttg gcg cgt ctt
Met Gln	Phe Tyr Leu Ala Ala	Tyr His Val Leu Leu Ala Arg Leu
2840	2845	2850
acc ggc 8604	agc aaa gac ata acc	atc ggc ctc gcc gaa acc aac cga
Thr Gly	Ser Lys Asp Ile Thr	Ile Gly Leu Ala Glu Thr Asn Arg

2855	2860	2865
tcc acc 8649 Ser Thr	atg gaa gaa att tcg Met Glu Glu Ile Ser	gcg atg ggc ttt ttc Ala Met Gly Phe Phe
		gct aac gtg Ala Asn Val
2870	2875	2880
ctt ccc 8694 Leu Pro	ctg cgc ttt gat gag Leu Arg Phe Asp Glu	ttc gtc ggc agc aag Phe Val Gly Ser Lys
		aca ttc ggc Thr Phe Gly
2885	2890	2895
gag cac 8739 Glu His	ctt gta gcc acc aag Leu Val Ala Thr Lys	gac agt gtg cgt gag Asp Ser Val Arg Glu
		gcc atg caa Ala Met Gln
2900	2905	2910
cac gcg 8784 His Ala	cgg gtg ccg tat ggc Arg Val Pro Tyr Gly	gtc atc ctc gac tgt Val Ile Leu Asp Cys
		cta ggc ctg Leu Gly Leu
2915	2920	2925
aat ctc 8829 Asn Leu	cct acc tca ggc gag Pro Thr Ser Gly Glu	gaa ccc aag act cag Glu Pro Lys Thr Gln
		aca cac gcc Thr His Ala
2930	2935	2940
ccc ttg 8874 Pro Leu	ttc cag gct gtc ttt Phe Gln Ala Val Phe	gat tac aag cag ggt Asp Tyr Lys Gln Gly
		caa gcg gag Gln Ala Glu
2945	2950	2955
agt ggc 8919 Ser Gly	tca att ggc aat gcc Ser Ile Gly Asn Ala	aaa atg acg agt gtt Lys Met Thr Ser Val
		ctc gct tcc Leu Ala Ser
2960	2965	2970

cgt gag cgc act cct tat gac atc gtt ctc gag atg tgg gat gac  
8964

Arg Glu Arg Thr Pro Tyr Asp Ile Val Leu Glu Met Trp Asp Asp

2975

2980

2985

cct acc aag gac cca ctc att cat gtc aaa ctt cag agc tcg ctg  
9009

Pro Thr Lys Asp Pro Leu Ile His Val Lys Leu Gln Ser Ser Leu

2990

2995

3000

tat ggc cct gag cac gct cag gcc ttt gta gac cac ttt tct tca  
9054

Tyr Gly Pro Glu His Ala Gln Ala Phe Val Asp His Phe Ser Ser

3005

3010

3015

atc ctc act atg ttc tcg atg aac ccg gct ctg aag ttg gcc tag  
9099

Ile Leu Thr Met Phe Ser Met Asn Pro Ala Leu Lys Leu Ala

3020

3025

3030

<210> 44

<211> 3032

<212> PRT

<213> *Penicillium citrinum*

<400> 44

Met Asp Gln Ala Asn Tyr Pro Asn Glu Pro Ile Val Val Val Gly Ser  
1 5 10 15

Gly Cys Arg Phe Pro Gly Gly Val Asn Thr Pro Ser Lys Leu Trp Glu  
20 25 30

Leu Leu Lys Glu Pro Arg Asp Val Gln Thr Lys Ile Pro Lys Glu Arg  
 35 40 45

Phe Asp Val Asp Thr Phe Tyr Ser Pro Asp Gly Thr His Pro Gly Arg  
 50 55 60

Thr Asn Ala Pro Phe Ala Tyr Leu Leu Gln Glu Asp Leu Arg Gly Phe  
 65 70 75 80

Asp Ala Ser Phe Phe Asn Ile Gln Ala Gly Glu Ala Glu Thr Ile Asp  
 85 90 95

Pro Gln Gln Arg Leu Leu Leu Glu Thr Val Tyr Glu Ala Val Ser Asn  
 100 105 110

Ala Gly Leu Arg Ile Gln Gly Leu Gln Gly Ser Ser Thr Ala Val Tyr  
 115 120 125

Val Gly Met Met Thr His Asp Tyr Glu Thr Ile Val Thr Arg Glu Leu  
 130 135 140

Asp Ser Ile Pro Thr Tyr Ser Ala Thr Gly Val Ala Val Ser Val Ala  
 145 150 155 160

Ser Asn Arg Val Ser Tyr Phe Phe Asp Trp His Gly Pro Ser Met Thr  
 165 170 175

Ile Asp Thr Ala Cys Ser Ser Ser Leu Ala Ala Val His Leu Ala Val  
 180 185 190

Gln Gln Leu Arg Thr Gly Glu Ser Thr Met Ala Val Ala Ala Gly Ala  
 195 200 205

Asn Leu Ile Leu Gly Pro Met Thr Phe Val Met Glu Ser Lys Leu Asn  
 210 215 220

Met Leu Ser Pro Asn Gly Arg Ser Arg Met Trp Asp Ala Ala Ala Asp  
 225 230 235 240



Gly Tyr Ala Arg Gly Glu Gly Val Cys Ser Ile Val Leu Lys Thr Leu  
                                   245                                  250                                  255

Ser Gln Ala Leu Arg Asp Gly Asp Ser Ile Glu Cys Val Ile Arg Glu  
                                   260                                  265                                  270

Thr Gly Ile Asn Gln Asp Gly Arg Thr Thr Gly Ile Thr Met Pro Asn  
                                   275                                  280                                  285

His Ser Ala Gln Glu Ala Leu Ile Arg Ala Thr Tyr Ala Lys Ala Gly  
                                   290                                  295                                  300

Leu Asp Ile Thr Asn Pro Gln Glu Arg Cys Gln Phe Phe Glu Ala His  
   305                                  310                                  315                                  320

Gly Thr Gly Thr Pro Ala Gly Asp Pro Gln Glu Ala Glu Ala Ile Ala  
                                   325                                  330                                  335

Thr Ala Phe Phe Gly His Lys Asp Gly Thr Ile Asp Ser Asp Gly Glu  
                                   340                                  345                                  350

Lys Asp Glu Leu Phe Val Gly Ser Ile Lys Thr Val Leu Gly His Thr  
                                   355                                  360                                  365

Glu Gly Thr Ala Gly Ile Ala Gly Leu Met Lys Ala Ser Phe Ala Val  
                                   370                                  375                                  380

Arg Asn Gly Val Ile Pro Pro Asn Leu Leu Phe Glu Lys Ile Ser Pro  
   385                                  390                                  395                                  400

Arg Val Ala Pro Phe Tyr Thr His Leu Lys Ile Ala Thr Glu Ala Thr  
                                   405                                  410                                  415

Glu Trp Pro Ile Val Ala Pro Gly Gln Pro Arg Arg Val Ser Val Asn  
                                   420                                  425                                  430

Ser Phe Gly Phe Gly Gly Thr Asn Ala His Ala Ile Ile Glu Glu Tyr

435					440					445					
Met	Ala	Pro	Pro	His	Lys	Pro	Thr	Ala	Val	Val	Thr	Glu	Val	Thr	Ser
	450					455					460				
Asp	Ala	Asp	Ala	Cys	Ser	Leu	Pro	Leu	Val	Leu	Ser	Ser	Lys	Ser	Gln
465					470					475					480
Arg	Ser	Met	Lys	Ala	Thr	Leu	Glu	Asn	Met	Leu	Gln	Phe	Leu	Glu	Thr
				485					490					495	
His	Asp	Asp	Val	Asp	Met	His	Asp	Ile	Ala	Tyr	Thr	Leu	Leu	Glu	Lys
			500					505					510		
Arg	Ser	Ile	Leu	Pro	Phe	Arg	Arg	Ala	Ile	Ala	Ala	His	Asn	Lys	Glu
		515					520					525			
Val	Ala	Arg	Ala	Ala	Leu	Glu	Ala	Ala	Ile	Ala	Asp	Gly	Glu	Val	Val
	530					535					540				
Thr	Asp	Phe	Arg	Thr	Asp	Ala	Asn	Asp	Asn	Pro	Arg	Val	Leu	Gly	Val
545					550					555					560
Phe	Thr	Gly	Gln	Gly	Ala	Gln	Trp	Pro	Gly	Met	Leu	Lys	Lys	Leu	Met
				565					570					575	
Val	Gly	Met	Pro	Phe	Val	Arg	Gly	Ile	Leu	Glu	Glu	Leu	Asp	Asn	Ser
			580					585					590		
Leu	Gln	Thr	Leu	Pro	Glu	Lys	Tyr	Arg	Pro	Thr	Trp	Thr	Leu	Tyr	Asp
		595					600					605			
Gln	Leu	Met	Leu	Glu	Gly	Asp	Ala	Ser	Asn	Val	Arg	Leu	Ala	Ser	Phe
	610					615					620				
Ser	Gln	Pro	Leu	Cys	Cys	Ala	Val	Gln	Ile	Val	Leu	Val	Arg	Leu	Leu
625					630					635					640

Ala Ala Ala Gly Ile Glu Phe Ser Ala Ile Val Gly His Ser Ser Gly  
645 650 655

Glu Ile Ala Cys Ala Phe Ala Ala Gly Phe Ile Ser Ala Thr Gln Ala  
660 665 670

Ile Arg Ile Ala His Leu Arg Gly Val Val Ser Ala Glu His Ala Ser  
675 680 685

Ser Pro Ser Gly Gln Thr Gly Ala Met Leu Ala Ala Gly Met Ser Tyr  
690 695 700

Asp Asp Ala Lys Glu Leu Cys Glu Leu Glu Ala Phe Glu Gly Arg Val  
705 710 715 720

Cys Val Ala Ala Ser Asn Ser Pro Asp Ser Val Thr Phe Ser Gly Asp  
725 730 735

Met Asp Ala Ile Gln His Val Glu Gly Val Leu Glu Asp Glu Ser Thr  
740 745 750

Phe Ala Arg Ile Leu Arg Val Asp Lys Ala Tyr His Ser His His Met  
755 760 765

His Pro Cys Ala Ala Pro Tyr Val Lys Ala Leu Leu Glu Cys Asp Cys  
770 775 780

Ala Val Ala Asp Gly Gln Gly Asn Asp Ser Val Ala Trp Phe Ser Ala  
785 790 795 800

Val His Glu Thr Ser Lys Gln Met Thr Val Gln Asp Val Met Pro Ala  
805 810 815

Tyr Trp Lys Asp Asn Leu Val Ser Pro Val Leu Phe Ser Gln Ala Val  
820 825 830

Gln Lys Ala Val Ile Thr His Arg Leu Ile Asp Val Ala Ile Glu Ile  
835 840 845

Gly Ala His Pro Ala Leu Lys Gly Pro Cys Leu Ala Thr Ile Lys Asp  
 850 855 860

Ala Leu Ala Gly Val Glu Leu Pro Tyr Thr Gly Cys Leu Ala Arg Asn  
 865 870 875 880

Val Asp Asp Val Asp Ala Phe Ala Gly Gly Leu Gly Tyr Ile Trp Glu  
 885 890 895

Arg Phe Gly Val Arg Ser Ile Asp Ala Glu Gly Phe Val Gln Gln Val  
 900 905 910

Arg Pro Asp Arg Ala Val Gln Asn Leu Ser Lys Ser Leu Pro Thr Tyr  
 915 920 925

Ser Trp Asp His Thr Arg Gln Tyr Trp Ala Glu Ser Arg Ser Thr Arg  
 930 935 940

Gln His Leu Arg Gly Gly Ala Pro His Leu Leu Leu Gly Lys Leu Ser  
 945 950 955 960

Ser Tyr Ser Thr Ala Ser Thr Phe Gln Trp Thr Asn Phe Ile Arg Pro  
 965 970 975

Arg Asp Leu Glu Trp Leu Asp Gly His Ala Leu Gln Gly Gln Thr Val  
 980 985 990

Phe Pro Ala Ala Gly Tyr Ile Ile Met Ala Met Glu Ala Ala Met Lys  
 995 1000 1005

Val Ala Gly Glu Arg Ala Ala Gln Val Gln Leu Leu Glu Ile Leu  
 1010 1015 1020

Asp Met Ser Ile Asn Lys Ala Ile Val Phe Glu Asp Glu Asn Thr  
 1025 1030 1035

Ser Val Glu Leu Asn Leu Thr Ala Glu Val Thr Ser Asp Asn Asp

1040						1045						1050					
Ala	Asp	Gly	Gln	Val	Thr	Val	Lys	Phe	Val	Ile	Asp	Ser	Cys	Leu			
1055						1060						1065					
Ala	Lys	Glu	Ser	Glu	Leu	Ser	Thr	Ser	Ala	Lys	Gly	Gln	Ile	Val			
1070						1075						1080					
Ile	Thr	Leu	Gly	Glu	Ala	Ser	Pro	Ser	Ser	Gln	Leu	Leu	Pro	Pro			
1085						1090						1095					
Pro	Glu	Glu	Glu	Tyr	Pro	Gln	Met	Asn	Asn	Val	Asn	Ile	Asp	Phe			
1100						1105						1110					
Phe	Tyr	Arg	Glu	Leu	Asp	Leu	Leu	Gly	Tyr	Asp	Tyr	Ser	Lys	Asp			
1115						1120						1125					
Phe	Arg	Arg	Leu	Gln	Thr	Met	Arg	Arg	Ala	Asp	Ser	Lys	Ala	Ser			
1130						1135						1140					
Gly	Thr	Leu	Ala	Phe	Leu	Pro	Leu	Lys	Asp	Glu	Leu	Arg	Asn	Glu			
1145						1150						1155					
Pro	Leu	Leu	Leu	His	Pro	Ala	Pro	Leu	Asp	Ile	Ala	Phe	Gln	Thr			
1160						1165						1170					
Val	Ile	Gly	Ala	Tyr	Ser	Ser	Pro	Gly	Asp	Arg	Arg	Leu	Arg	Ser			
1175						1180						1185					
Leu	Tyr	Val	Pro	Thr	His	Val	Asp	Arg	Val	Thr	Leu	Ile	Pro	Ser			
1190						1195						1200					
Leu	Cys	Ile	Ser	Ala	Gly	Asn	Ser	Gly	Glu	Thr	Glu	Leu	Ala	Phe			
1205						1210						1215					
Asp	Thr	Ile	Asn	Thr	His	Asp	Lys	Gly	Asp	Phe	Leu	Ser	Gly	Asp			
1220						1225						1230					

Ile Thr Val Tyr Asp Ser Thr Lys Thr Thr Leu Phe Gln Val Asp  
 1235 1240 1245

Asn Ile Val Phe Lys Pro Phe Ser Pro Pro Thr Ala Ser Thr Asp  
 1250 1255 1260

His Arg Ile Phe Ala Lys Trp Val Trp Gly Pro Leu Thr Pro Glu  
 1265 1270 1275

Lys Leu Leu Glu Asp Pro Ala Thr Leu Ile Ile Ala Arg Asp Lys  
 1280 1285 1290

Glu Asp Ile Leu Thr Ile Glu Arg Ile Val Tyr Phe Tyr Ile Lys  
 1295 1300 1305

Ser Phe Leu Ala Gln Ile Thr Pro Asp Asp Arg Gln Asn Ala Asp  
 1310 1315 1320

Leu His Ser Gln Lys Tyr Ile Glu Trp Cys Asp Gln Val Gln Ala  
 1325 1330 1335

Asp Ala Arg Ala Gly His His Gln Trp Tyr Gln Glu Ser Trp Glu  
 1340 1345 1350

Glu Asp Thr Ser Val His Ile Glu Gln Met Cys Glu Ser Asn Ser  
 1355 1360 1365

Ser His Pro His Val Arg Leu Ile Gln Arg Val Gly Lys Glu Leu  
 1370 1375 1380

Ile Ser Ile Val Arg Gly Asn Gly Asp Pro Leu Asp Ile Met Asn  
 1385 1390 1395

Arg Asp Gly Leu Phe Thr Glu Tyr Tyr Thr Asn Lys Leu Ala Phe  
 1400 1405 1410

Gly Ser Ala Ile His Val Val Gln Asp Leu Val Ser Gln Ile Ala  
 1415 1420 1425



His Arg Tyr Gln Ser Ile Asp Ile Leu Glu Ile Gly Leu Gly Thr  
1430 1435 1440

Gly Ile Ala Thr Lys Arg Val Leu Ala Ser Pro Gln Leu Gly Phe  
1445 1450 1455

Asn Ser Tyr Thr Cys Thr Asp Ile Ser Ala Asp Val Ile Gly Lys  
1460 1465 1470

Ala Arg Glu Gln Leu Ser Glu Phe Asp Gly Leu Met Gln Phe Glu  
1475 1480 1485

Ala Leu Asp Ile Asn Arg Ser Pro Ala Glu Gln Gly Phe Lys Pro  
1490 1495 1500

His Ser Tyr Asp Leu Ile Ile Ala Ser Asp Val Leu His Ala Ser  
1505 1510 1515

Ser Asn Phe Glu Glu Lys Leu Ala His Ile Arg Ser Leu Leu Lys  
1520 1525 1530

Pro Gly Gly His Leu Val Thr Phe Gly Val Thr His Arg Glu Pro  
1535 1540 1545

Ala Arg Leu Ala Phe Ile Ser Gly Leu Phe Ala Asp Arg Trp Thr  
1550 1555 1560

Gly Glu Asp Glu Thr Arg Ala Leu Ser Ala Ser Gly Ser Val Asp  
1565 1570 1575

Gln Trp Glu His Thr Leu Lys Arg Val Gly Phe Ser Gly Val Asp  
1580 1585 1590

Ser Arg Thr Leu Asp Arg Glu Asp Asp Leu Ile Pro Ser Val Phe  
1595 1600 1605

Ser Thr His Ala Val Asp Ala Thr Val Glu Arg Leu Tyr Asp Pro

1610						1615						1620			
Leu	Ser	Ala	Pro	Leu	Lys	Asp	Ser	Tyr	Pro	Pro	Leu	Val	Val	Ile	
1625						1630					1635				
Gly	Gly	Glu	Ser	Thr	Lys	Thr	Glu	Arg	Ile	Leu	Asn	Asp	Met	Lys	
1640						1645					1650				
Ala	Ala	Leu	Pro	His	Arg	His	Ile	His	Ser	Val	Lys	Arg	Leu	Glu	
1655						1660					1665				
Ser	Val	Leu	Asp	Asp	Pro	Ala	Leu	Gln	Pro	Lys	Ser	Thr	Phe	Val	
1670						1675					1680				
Ile	Leu	Ser	Glu	Leu	Asp	Asp	Glu	Val	Phe	Cys	Asn	Leu	Glu	Glu	
1685						1690					1695				
Asp	Lys	Phe	Glu	Ala	Val	Lys	Ser	Leu	Leu	Phe	Tyr	Ala	Gly	Arg	
1700						1705					1710				
Met	Met	Trp	Leu	Thr	Glu	Asn	Ala	Trp	Ile	Asp	His	Pro	His	Gln	
1715						1720					1725				
Ala	Ser	Thr	Ile	Gly	Met	Leu	Arg	Thr	Ile	Lys	Leu	Glu	Asn	Pro	
1730						1735					1740				
Asp	Leu	Gly	Thr	His	Val	Phe	Asp	Val	Asp	Thr	Val	Glu	Asn	Leu	
1745						1750					1755				
Asp	Thr	Lys	Phe	Phe	Val	Glu	Gln	Leu	Leu	Arg	Phe	Glu	Glu	Ser	
1760						1765					1770				
Asp	Asp	Gln	Leu	Leu	Glu	Ser	Ile	Thr	Trp	Thr	His	Glu	Pro	Glu	
1775						1780					1785				
Val	Tyr	Trp	Cys	Lys	Gly	Arg	Ala	Trp	Val	Pro	Arg	Leu	Lys	Gln	
1790						1795					1800				

Asp 1805	Ile	Ala	Arg	Asn	Asp	Arg 1810	Met	Asn	Ser	Ser	Arg 1815	Arg	Pro	Ile
Phe 1820	Gly	Asn	Phe	Asn	Ser	Ser 1825	Lys	Thr	Ala	Ile	Ala 1830	Leu	Lys	Glu
Ala 1835	Arg	Gly	Ala	Ser	Ser	Ser 1840	Met	Tyr	Tyr	Leu	Glu 1845	Ser	Thr	Glu
Thr 1850	Cys	Asp	Ser	Leu	Glu	Asp 1855	Ala	Arg	His	Ala	Gly 1860	Lys	Ala	Thr
Val 1865	Arg	Val	Arg	Tyr	Ala	Leu 1870	Pro	Gln	Ala	Ile	Arg 1875	Val	Gly	His
Leu 1880	Gly	Tyr	Phe	His	Val	Val 1885	Gln	Gly	Ser	Ile	Leu 1890	Glu	Asn	Thr
Cys 1895	Glu	Val	Pro	Val	Val	Ala 1900	Leu	Ala	Glu	Lys	Asn 1905	Gly	Ser	Ile
Leu 1910	His	Val	Pro	Arg	Asn	Tyr 1915	Met	His	Ser	Leu	Pro 1920	Asp	Asn	Met
Ala 1925	Glu	Gly	Glu	Asp	Ser	Ser 1930	Phe	Leu	Leu	Ser	Thr 1935	Ala	Ala	Ala
Leu 1940	Leu	Ala	Glu	Thr	Ile	Leu 1945	Ser	Ser	Ala	Gln	Ser 1950	Phe	Gly	Ser
Asp 1955	Ala	Ser	Ile	Leu	Ile	Met 1960	Glu	Pro	Pro	Ile	Phe 1965	Cys	Val	Lys
Ala 1970	Ile	Leu	Glu	Ser	Ala	Lys 1975	Thr	Tyr	Gly	Val	Gln 1980	Val	His	Leu
Ala 1985	Thr	Thr	Leu	Ser	Asp	Val 1990	Lys	Thr	Ile	Pro	Ala 1995	Pro	Trp	Ile

Arg	Leu	His	Ala	Lys	Glu	Thr	Asp	Ala	Arg	Leu	Lys	His	Ser	Leu
	2000					2005					2010			
Pro	Thr	Asn	Met	Met	Ala	Phe	Phe	Asp	Leu	Ser	Thr	Asp	Arg	Thr
	2015					2020					2025			
Ala	Ala	Gly	Ile	Thr	Asn	Arg	Leu	Ala	Lys	Leu	Leu	Pro	Pro	Ser
	2030					2035					2040			
Cys	Phe	Met	Tyr	Ser	Gly	Asp	Tyr	Leu	Ile	Arg	Ser	Thr	Ala	Ser
	2045					2050					2055			
Thr	Tyr	Lys	Val	Ser	His	Val	Glu	Asp	Ile	Pro	Ile	Leu	Glu	His
	2060					2065					2070			
Ser	Val	Ala	Met	Ala	Lys	Asn	Thr	Val	Ser	Ala	Ser	Thr	Val	Asp
	2075					2080					2085			
Asp	Thr	Glu	Lys	Val	Ile	Thr	Ala	Thr	Gln	Ile	Leu	Leu	Pro	Gly
	2090					2095					2100			
Gln	Leu	Ser	Val	Asn	His	Asn	Asp	Gln	Arg	Phe	Asn	Leu	Ala	Thr
	2105					2110					2115			
Val	Ile	Asp	Trp	Lys	Glu	Asn	Glu	Val	Ser	Ala	Arg	Ile	Cys	Pro
	2120					2125					2130			
Ile	Asp	Ser	Gly	Asn	Leu	Phe	Ser	Asn	Lys	Lys	Thr	Tyr	Leu	Leu
	2135					2140					2145			
Val	Gly	Leu	Thr	Gly	Asp	Leu	Gly	Arg	Ser	Leu	Cys	Arg	Trp	Met
	2150					2155					2160			
Ile	Leu	His	Gly	Ala	Arg	His	Val	Val	Leu	Thr	Ser	Arg	Asn	Pro
	2165					2170					2175			
Arg	Leu	Asp	Pro	Lys	Trp	Ile	Ala	Asn	Met	Glu	Ala	Leu	Gly	Gly

2180						2185						2190			
Asp	Ile	Thr	Val	Leu	Ser	Met	Asp	Val	Ala	Asn	Glu	Asp	Ser	Val	
2195						2200					2205				
Asp	Ala	Gly	Leu	Gly	Lys	Leu	Val	Asp	Met	Lys	Leu	Pro	Pro	Val	
2210						2215					2220				
Ala	Gly	Ile	Ala	Phe	Gly	Pro	Leu	Val	Leu	Gln	Asp	Val	Met	Leu	
2225						2230					2235				
Lys	Asn	Met	Asp	His	Gln	Met	Met	Asp	Met	Val	Leu	Lys	Pro	Lys	
2240						2245					2250				
Val	Gln	Gly	Ala	Arg	Ile	Leu	His	Glu	Arg	Phe	Ser	Glu	Gln	Thr	
2255						2260					2265				
Gly	Ser	Lys	Ala	Leu	Asp	Phe	Phe	Ile	Met	Phe	Ser	Ser	Ile	Val	
2270						2275					2280				
Ala	Val	Ile	Gly	Asn	Pro	Gly	Gln	Ser	Asn	Tyr	Gly	Ala	Ala	Asn	
2285						2290					2295				
Ala	Tyr	Leu	Gln	Ala	Leu	Ala	Gln	Gln	Arg	Cys	Ala	Arg	Gly	Leu	
2300						2305					2310				
Ala	Gly	Ser	Thr	Ile	Asp	Ile	Gly	Ala	Val	Tyr	Gly	Val	Gly	Phe	
2315						2320					2325				
Val	Thr	Arg	Ala	Glu	Met	Glu	Glu	Asp	Phe	Asp	Ala	Ile	Arg	Phe	
2330						2335					2340				
Met	Phe	Asp	Ser	Val	Glu	Glu	His	Glu	Leu	His	Thr	Leu	Phe	Ala	
2345						2350					2355				
Glu	Ala	Val	Val	Ser	Asp	Gln	Arg	Ala	Arg	Gln	Gln	Pro	Gln	Arg	
2360						2365					2370				

Lys Thr Val Ile Asp Met Ala Asp Leu Glu Leu Thr Thr Gly Ile  
 2375 2380 2385

Pro Asp Leu Asp Pro Ala Leu Gln Asp Arg Ile Ile Tyr Phe Asn  
 2390 2395 2400

Asp Pro Arg Phe Gly Asn Phe Lys Ile Pro Gly Gln Arg Gly Asp  
 2405 2410 2415

Gly Gly Asp Asn Gly Ser Gly Ser Lys Gly Ser Ile Ala Asp Gln  
 2420 2425 2430

Leu Lys Gln Ala Thr Thr Leu Asp Gln Val Arg Gln Ile Val Ile  
 2435 2440 2445

Asp Gly Leu Ser Glu Lys Leu Arg Val Thr Leu Gln Val Ser Asp  
 2450 2455 2460

Gly Glu Ser Val Asp Pro Thr Ile Pro Leu Ile Asp Gln Gly Val  
 2465 2470 2475

Asp Ser Leu Gly Ala Val Thr Val Gly Ser Trp Phe Ser Lys Gln  
 2480 2485 2490

Leu Tyr Leu Asp Leu Pro Leu Leu Arg Val Leu Gly Gly Ala Ser  
 2495 2500 2505

Val Ala Asp Leu Ala Asp Asp Ala Ala Thr Arg Leu Pro Ala Thr  
 2510 2515 2520

Ser Ile Pro Leu Leu Leu Gln Ile Gly Asp Ser Thr Gly Thr Ser  
 2525 2530 2535

Asp Ser Gly Ala Ser Pro Thr Pro Thr Asp Ser His Asp Glu Ala  
 2540 2545 2550

Ser Ser Ala Thr Ser Thr Asp Ala Ser Ser Ala Glu Glu Asp Glu  
 2555 2560 2565



Glu	Gln	Glu	Asp	Asp	Asn	Glu	Gln	Gly	Gly	Arg	Lys	Ile	Leu	Arg
2570						2575					2580			
Arg	Glu	Arg	Leu	Ser	Leu	Gly	Gln	Glu	Tyr	Ser	Trp	Arg	Gln	Gln
2585						2590					2595			
Gln	Met	Val	Lys	Asp	His	Thr	Ile	Phe	Asn	Asn	Thr	Ile	Gly	Met
2600						2605					2610			
Phe	Met	Lys	Gly	Thr	Ile	Asp	Leu	Asp	Arg	Leu	Arg	Arg	Ala	Leu
2615						2620					2625			
Lys	Ala	Ser	Leu	Arg	Arg	His	Glu	Ile	Phe	Arg	Thr	Cys	Phe	Val
2630						2635					2640			
Thr	Gly	Asp	Asp	Tyr	Ser	Ser	Asp	Leu	Asn	Gly	Pro	Val	Gln	Val
2645						2650					2655			
Val	Leu	Lys	Asn	Pro	Glu	Asn	Arg	Val	His	Phe	Val	Gln	Val	Asn
2660						2665					2670			
Asn	Ala	Ala	Glu	Ala	Glu	Glu	Glu	Tyr	Arg	Lys	Leu	Glu	Lys	Thr
2675						2680					2685			
Asn	Tyr	Ser	Ile	Ser	Thr	Gly	Asp	Thr	Leu	Arg	Leu	Val	Asp	Phe
2690						2695					2700			
Tyr	Trp	Gly	Thr	Asp	Asp	His	Leu	Leu	Val	Ile	Gly	Tyr	His	Arg
2705						2710					2715			
Leu	Val	Gly	Asp	Gly	Ser	Thr	Thr	Glu	Asn	Leu	Phe	Asn	Glu	Ile
2720						2725					2730			
Gly	Gln	Ile	Tyr	Ser	Gly	Val	Lys	Met	Gln	Arg	Pro	Ser	Thr	Gln
2735						2740					2745			
Phe	Ser	Asp	Leu	Ala	Val	Gln	Gln	Arg	Glu	Asn	Leu	Glu	Asn	Gly

2750						2755						2760			
Arg	Met	Gly	Asp	Asp	Ile	Ala	Phe	Trp	Lys	Ser	Met	His	Ser	Lys	
	2765					2770					2775				
Val	Ser	Ser	Ser	Ala	Pro	Thr	Val	Leu	Pro	Ile	Met	Asn	Leu	Ile	
	2780					2785					2790				
Asn	Asp	Pro	Ala	Ala	Asn	Ser	Glu	Gln	Gln	Gln	Ile	Gln	Pro	Phe	
	2795					2800					2805				
Thr	Trp	Gln	Gln	Tyr	Glu	Ala	Ile	Ala	Arg	Leu	Asp	Pro	Met	Val	
	2810					2815					2820				
Ala	Phe	Arg	Ile	Lys	Glu	Arg	Ser	Arg	Lys	His	Lys	Ala	Thr	Pro	
	2825					2830					2835				
Met	Gln	Phe	Tyr	Leu	Ala	Ala	Tyr	His	Val	Leu	Leu	Ala	Arg	Leu	
	2840					2845					2850				
Thr	Gly	Ser	Lys	Asp	Ile	Thr	Ile	Gly	Leu	Ala	Glu	Thr	Asn	Arg	
	2855					2860					2865				
Ser	Thr	Met	Glu	Glu	Ile	Ser	Ala	Met	Gly	Phe	Phe	Ala	Asn	Val	
	2870					2875					2880				
Leu	Pro	Leu	Arg	Phe	Asp	Glu	Phe	Val	Gly	Ser	Lys	Thr	Phe	Gly	
	2885					2890					2895				
Glu	His	Leu	Val	Ala	Thr	Lys	Asp	Ser	Val	Arg	Glu	Ala	Met	Gln	
	2900					2905					2910				
His	Ala	Arg	Val	Pro	Tyr	Gly	Val	Ile	Leu	Asp	Cys	Leu	Gly	Leu	
	2915					2920					2925				
Asn	Leu	Pro	Thr	Ser	Gly	Glu	Glu	Pro	Lys	Thr	Gln	Thr	His	Ala	
	2930					2935					2940				

Pro Leu Phe Gln Ala Val Phe Asp Tyr Lys Gln Gly Gln Ala Glu  
 2945 2950 2955

Ser Gly Ser Ile Gly Asn Ala Lys Met Thr Ser Val Leu Ala Ser  
 2960 2965 2970

Arg Glu Arg Thr Pro Tyr Asp Ile Val Leu Glu Met Trp Asp Asp  
 2975 2980 2985

Pro Thr Lys Asp Pro Leu Ile His Val Lys Leu Gln Ser Ser Leu  
 2990 2995 3000

Tyr Gly Pro Glu His Ala Gln Ala Phe Val Asp His Phe Ser Ser  
 3005 3010 3015

Ile Leu Thr Met Phe Ser Met Asn Pro Ala Leu Lys Leu Ala  
 3020 3025 3030

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<211> 7692

<212> DNA

<213> Penicillium citrinum

<220>

<221> CDS

<222> (1)..(7692)

<400> 45

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 48

Met Asn Asn Thr Pro Ala Val Thr Ala Thr Ala Thr Ala Thr

1

5

10

15

gca acc gca atg gca ggc tcg gct tgc tct aac aca tcc acg ccc att  
 96  
 Ala Thr Ala Met Ala Gly Ser Ala Cys Ser Asn Thr Ser Thr Pro Ile

20

25

30

gcc ata gtt gga atg gga tgt cga ttt gct gga gat gca acg agt cca  
 144  
 Ala Ile Val Gly Met Gly Cys Arg Phe Ala Gly Asp Ala Thr Ser Pro

35

40

45

cag aag ctt tgg gaa atg gtt gaa aga gga ggc agt gcc tgg tct aag  
 192  
 Gln Lys Leu Trp Glu Met Val Glu Arg Gly Gly Ser Ala Trp Ser Lys

50

55

60

gtc ccc tcc tcg cga ttc aat gtg aga gga gta tac cac ccg aat ggc  
 240  
 Val Pro Ser Ser Arg Phe Asn Val Arg Gly Val Tyr His Pro Asn Gly

65

70

75

80

gaa agg gtc ggg tcc acc cac gta aag ggt gga cac ttc atc gac gag  
 288  
 Glu Arg Val Gly Ser Thr His Val Lys Gly Gly His Phe Ile Asp Glu

85

90

95

gat cct gct tta ttt gac gcc gcg ttc ttc aac atg acc aca gag gtc  
 336  
 Asp Pro Ala Leu Phe Asp Ala Ala Phe Phe Asn Met Thr Thr Glu Val

100

105

110

gcc agc tgc atg gat ccg cag tat cgg ctt atg ctt gag gtg gtc tac  
 384  
 Ala Ser Cys Met Asp Pro Gln Tyr Arg Leu Met Leu Glu Val Val Tyr

115

120

125

gaa tcg ctg gag agt gcc ggt atc acc atc gat ggt atg gca ggc tct

432

Glu Ser Leu Glu Ser Ala Gly Ile Thr Ile Asp Gly Met Ala Gly Ser

130

135

140

aat acg tcg gtg ttt ggg ggt gtc atg tac cac gac tat cag gat tcg

480

Asn Thr Ser Val Phe Gly Gly Val Met Tyr His Asp Tyr Gln Asp Ser

145

150

155

160

ctc aat cgt gac ccc gag aca gtt ccg cgt tat ttc ata act ggc aac

528

Leu Asn Arg Asp Pro Glu Thr Val Pro Arg Tyr Phe Ile Thr Gly Asn

165

170

175

tca gga aca atg ctt tcg aac cgg ata tca cac ttc tac gac tta cgt

576

Ser Gly Thr Met Leu Ser Asn Arg Ile Ser His Phe Tyr Asp Leu Arg

180

185

190

ggt ccc agc gtg acg gtt gac acg gcc tgt tcg acg aca ttg acc gca

624

Gly Pro Ser Val Thr Val Asp Thr Ala Cys Ser Thr Thr Leu Thr Ala

195

200

205

ctg cac ttg gcg tgc cag agc tta cgt act ggg gag tca gat aca gcc

672

Leu His Leu Ala Cys Gln Ser Leu Arg Thr Gly Glu Ser Asp Thr Ala

210

215

220

atc gtt atc ggt gca aat ctt ctg ctc aat ccc gat gtt ttt gtt acg

720

Ile Val Ile Gly Ala Asn Leu Leu Leu Asn Pro Asp Val Phe Val Thr

225

230

235

240

atg tca aac ctg gga ttt ttg tcc ccg gat ggt atc tcg tac tct ttt

768

Met Ser Asn Leu Gly Phe Leu Ser Pro Asp Gly Ile Ser Tyr Ser Phe

245

250

255

gat cct cga gcg aat gga tat ggt cgc ggg gaa gga att gcc gct ctg

816

Asp Pro Arg Ala Asn Gly Tyr Gly Arg Gly Glu Gly Ile Ala Ala Leu

260

265

270

gta ata aag gcc ctc cct aac gcg ttg cga gac caa gac cct atc cga

864

Val Ile Lys Ala Leu Pro Asn Ala Leu Arg Asp Gln Asp Pro Ile Arg

275

280

285

gcc gtc att cga gag aca gcg ctg aac cag gat ggc aaa aca ccc gca

912

Ala Val Ile Arg Glu Thr Ala Leu Asn Gln Asp Gly Lys Thr Pro Ala

290

295

300

att act gcg ccg agt gat gtg gcg cag aaa agt ctg atc cag gag tgt

960

Ile Thr Ala Pro Ser Asp Val Ala Gln Lys Ser Leu Ile Gln Glu Cys

305

310

315

320

tac gat aag gct ggg cta gat atg tcg ttg acc tcg tac gtg gag gcc

1008

Tyr Asp Lys Ala Gly Leu Asp Met Ser Leu Thr Ser Tyr Val Glu Ala

325

330

335

cac gga act gga aca cca act ggt gac ccc ctt gaa atc tca gca att

1056

His Gly Thr Gly Thr Pro Thr Gly Asp Pro Leu Glu Ile Ser Ala Ile

340

345

350

tca gca gct ttt aaa gga cat cct ctg cac ctt ggc tct gtg aaa gca

1104

Ser Ala Ala Phe Lys Gly His Pro Leu His Leu Gly Ser Val Lys Ala



355	360	365
aat att ggc cat aca gaa gcc gcc agt ggc ctg gcc agt ata atc aag		
1152		
Asn Ile Gly His Thr Glu Ala Ala Ser Gly Leu Ala Ser Ile Ile Lys		
370	375	380
gtg gcc ttg gcc ttg gag aag ggc ttg att ccc cct aat gcg cgg ttc		
1200		
Val Ala Leu Ala Leu Glu Lys Gly Leu Ile Pro Pro Asn Ala Arg Phe		
385	390	395
ctg caa aag aac agc aag ctg atg ctt gac caa aag aac atc aag atc		
1248		
Leu Gln Lys Asn Ser Lys Leu Met Leu Asp Gln Lys Asn Ile Lys Ile		
405	410	415
ccc atg tct gct caa gac tgg cct gtg aaa gat ggg act cgt cgc gca		
1296		
Pro Met Ser Ala Gln Asp Trp Pro Val Lys Asp Gly Thr Arg Arg Ala		
420	425	430
tct gtc aat aac ttc ggc ttt ggt ggt tcg aat gct cac gtc att ttg		
1344		
Ser Val Asn Asn Phe Gly Phe Gly Gly Ser Asn Ala His Val Ile Leu		
435	440	445
gaa tca tat gat cgc gca tca ttg gcc ctg cca gag gat caa gtg cat		
1392		
Glu Ser Tyr Asp Arg Ala Ser Leu Ala Leu Pro Glu Asp Gln Val His		
450	455	460
gtc aat ggt aac tct gag cat ggt agg gtt gag gat ggt tcc aaa cag		
1440		
Val Asn Gly Asn Ser Glu His Gly Arg Val Glu Asp Gly Ser Lys Gln		

465	470	475	480
agc cgc ata tac gtt gtg cgt gcc aag gac gag caa gct tgt cgg cga			
1488			
Ser Arg Ile Tyr Val Val Arg Ala Lys Asp Glu Gln Ala Cys Arg Arg			
	485	490	495
acg ata gca agc ctg cga gac tac att aaa tcc gtc gct gac att gac			
1536			
Thr Ile Ala Ser Leu Arg Asp Tyr Ile Lys Ser Val Ala Asp Ile Asp			
	500	505	510
ggg gaa ccc ttc ctc gcc agc ctc gcc tat aca cta ggc tct cgc cgt			
1584			
Gly Glu Pro Phe Leu Ala Ser Leu Ala Tyr Thr Leu Gly Ser Arg Arg			
	515	520	525
tcc att ctg cca tgg acg tca gtg tat gta gca gac agc ctt ggc ggc			
1632			
Ser Ile Leu Pro Trp Thr Ser Val Tyr Val Ala Asp Ser Leu Gly Gly			
	530	535	540
ctt gtt tct gcc ctc agc gat gag tcc aat caa cca aaa cga gcg aat			
1680			
Leu Val Ser Ala Leu Ser Asp Glu Ser Asn Gln Pro Lys Arg Ala Asn			
545	550	555	560
gag aaa gta cgg ctc gga ttt gta ttc acc ggt cag ggg gcg cag tgg			
1728			
Glu Lys Val Arg Leu Gly Phe Val Phe Thr Gly Gln Gly Ala Gln Trp			
	565	570	575
cat gca atg ggc aga gag ctg gtc aat aca ttc cca gta ttc aaa cag			
1776			
His Ala Met Gly Arg Glu Leu Val Asn Thr Phe Pro Val Phe Lys Gln			
	580	585	590

gcg att ctt gaa tgt gat ggc tac atc aag caa ctg ggc gcg agt tgg  
1824

Ala Ile Leu Glu Cys Asp Gly Tyr Ile Lys Gln Leu Gly Ala Ser Trp

595

600

605

aat ttt atg gag gag ctc cac cgt gat gag ctg acg act cgg gta aat  
1872

Asn Phe Met Glu Glu Leu His Arg Asp Glu Leu Thr Thr Arg Val Asn

610

615

620

gat gcc gaa tac agt cta cca ctg tca acc gct atc caa att gca ctt  
1920

Asp Ala Glu Tyr Ser Leu Pro Leu Ser Thr Ala Ile Gln Ile Ala Leu

625

630

635

640

gtg cgt ctc ctt tgg tca tgg gga att cgg cca acg ggg ata acc agt  
1968

Val Arg Leu Leu Trp Ser Trp Gly Ile Arg Pro Thr Gly Ile Thr Ser

645

650

655

cac tca agt gga gag gct gct gct gcc tac gca gct ggg gct tta tcc  
2016

His Ser Ser Gly Glu Ala Ala Ala Ala Tyr Ala Ala Gly Ala Leu Ser

660

665

670

gcg cgg tcg gcc att ggg atc act tat ata cgc ggt gta ttg acc act  
2064

Ala Arg Ser Ala Ile Gly Ile Thr Tyr Ile Arg Gly Val Leu Thr Thr

675

680

685

aag ccc aag ccc gca ttg gca gcc aaa gga gga atg atg gcg gtg ggt  
2112

Lys Pro Lys Pro Ala Leu Ala Ala Lys Gly Gly Met Met Ala Val Gly

690

695

700

ctt ggt cgc agt gag acc aat gtt tac att tcg cgt ctc aac cag gag  
2160

Leu Gly Arg Ser Glu Thr Asn Val Tyr Ile Ser Arg Leu Asn Gln Glu

705

710

715

720

gac ggc tgt gtg gtg gtt gga tgt atc aac agt caa tgt agt gtg acg  
2208

Asp Gly Cys Val Val Val Gly Cys Ile Asn Ser Gln Cys Ser Val Thr

725

730

735

gtg tcg gga gat ttg ggt gca atc gag aaa ctt gaa aag ttg tta cac  
2256

Val Ser Gly Asp Leu Gly Ala Ile Glu Lys Leu Glu Lys Leu Leu His

740

745

750

gcc gat ggc atc ttt acc agg aaa ctg aaa gtc act gaa gcc ttc cat  
2304

Ala Asp Gly Ile Phe Thr Arg Lys Leu Lys Val Thr Glu Ala Phe His

755

760

765

tca agc cac atg cga cca atg gca gat gcc ttt ggg gcg tca ctg aga  
2352

Ser Ser His Met Arg Pro Met Ala Asp Ala Phe Gly Ala Ser Leu Arg

770

775

780

gat ctg ttc aac tcg gat aac aac aac gac aat ccc aat gct gac acc  
2400

Asp Leu Phe Asn Ser Asp Asn Asn Asn Asp Asn Pro Asn Ala Asp Thr

785

790

795

800

tca aag ggt gta tta tat tca tca cct aag act ggt agt cgc atg acc  
2448

Ser Lys Gly Val Leu Tyr Ser Ser Pro Lys Thr Gly Ser Arg Met Thr

805

810

815

gat ctt aaa ttg cta ttg gat ccc aca cac tgg atg gat agt atg cta

2496

Asp Leu Lys Leu Leu Leu Asp Pro Thr His Trp Met Asp Ser Met Leu

820

825

830

cag ccg gta gag ttc gag tcc tca ctc cgc gag atg tgc ttt gat ccc

2544

Gln Pro Val Glu Phe Glu Ser Ser Leu Arg Glu Met Cys Phe Asp Pro

835

840

845

aac acc aaa gag aaa gcc gtc gat gtg att att gaa ata ggg cct cac

2592

Asn Thr Lys Glu Lys Ala Val Asp Val Ile Ile Glu Ile Gly Pro His

850

855

860

gga gcg ctt ggt ggt cca atc aac caa gtc atg cag gat ctg ggt ctg

2640

Gly Ala Leu Gly Gly Pro Ile Asn Gln Val Met Gln Asp Leu Gly Leu

865

870

875

880

aaa gga aca gat ata aac tat ctc agt tgc ctt tct cgc ggc aga agc

2688

Lys Gly Thr Asp Ile Asn Tyr Leu Ser Cys Leu Ser Arg Gly Arg Ser

885

890

895

tcg ttg gag aca atg tat cgt gct gct acg gag ttg ata agc aag ggt

2736

Ser Leu Glu Thr Met Tyr Arg Ala Ala Thr Glu Leu Ile Ser Lys Gly

900

905

910

tat ggg ctc aaa atg gac gct ata aac ttt cct cat gga aga aaa gag

2784

Tyr Gly Leu Lys Met Asp Ala Ile Asn Phe Pro His Gly Arg Lys Glu

915

920

925

ccc aga gtg aag gta ctg agc gat ttg ccg gcg tac ccg tgg aat cac

2832

Pro Arg Val Lys Val Leu Ser Asp Leu Pro Ala Tyr Pro Trp Asn His

930

935

940

caa acc cgt tat tgg aga gag cct cgc ggc agt cgt gag tcc aaa cag  
2880

Gln Thr Arg Tyr Trp Arg Glu Pro Arg Gly Ser Arg Glu Ser Lys Gln

945

950

955

960

aga acc cat ccg cct cac act ttg ata ggc tca cgg gaa tct ctc tct  
2928

Arg Thr His Pro Pro His Thr Leu Ile Gly Ser Arg Glu Ser Leu Ser

965

970

975

cct cat ttc gcg cct aaa tgg aaa cat gtt ctc cgt ctg tca gat att  
2976

Pro His Phe Ala Pro Lys Trp Lys His Val Leu Arg Leu Ser Asp Ile

980

985

990

cca tgg ata cga gat cac gtc gtt ggt tcg agc atc atc ttt ccg gga  
3024

Pro Trp Ile Arg Asp His Val Val Gly Ser Ser Ile Ile Phe Pro Gly

995

1000

1005

gct ggc ttc atc agc atg gcc atc gag ggg ttt tca caa gtc tgc  
3069

Ala Gly Phe Ile Ser Met Ala Ile Glu Gly Phe Ser Gln Val Cys

1010

1015

1020

cca cca gtt gcg ggg gct agc atc aac tac aac ttg cgt gac gtt  
3114

Pro Pro Val Ala Gly Ala Ser Ile Asn Tyr Asn Leu Arg Asp Val

1025

1030

1035

gaa ctc gcg cag gct ctc ata ata ccc gct gat gca gaa gca gag  
3159

Glu Leu Ala Gln Ala Leu Ile Ile Pro Ala Asp Ala Glu Ala Glu



1040	1045	1050
gtt gac 3204	ctg cgc cta acg atc	cgt tca tgt gag gaa agg tcc ctc
Val Asp	Leu Arg Leu Thr Ile	Arg Ser Cys Glu Glu Arg Ser Leu
1055	1060	1065
ggc aca 3249	aag aac tgg cat caa	ttt tct gtg cac tca att tcg ggc
Gly Thr	Lys Asn Trp His Gln	Phe Ser Val His Ser Ile Ser Gly
1070	1075	1080
gaa aat 3294	aat acc tgg aca gaa	cac tgc acc gga tta ata cgt tcg
Glu Asn	Asn Thr Trp Thr Glu	His Cys Thr Gly Leu Ile Arg Ser
1085	1090	1095
gag agc 3339	gaa aga agc cac ctt	gac tgt tca act gtg gaa gcc tca
Glu Ser	Glu Arg Ser His Leu	Asp Cys Ser Thr Val Glu Ala Ser
1100	1105	1110
cgc agg 3384	ttg aat cta ggc tca	gat aac cgg agc att gat ccc aac
Arg Arg	Leu Asn Leu Gly Ser	Asp Asn Arg Ser Ile Asp Pro Asn
1115	1120	1125
gat ctc 3429	tgg gag tcc tta cac	gcg aat ggg ata tgc cac gga ccc
Asp Leu	Trp Glu Ser Leu His	Ala Asn Gly Ile Cys His Gly Pro
1130	1135	1140
att ttt 3474	cag aac att cag cga	att caa aac aat gga cag ggc tcg
Ile Phe	Gln Asn Ile Gln Arg	Ile Gln Asn Asn Gly Gln Gly Ser

1145	1150	1155
ttt tgc aga ttt tcc att gct gac act gcc tcg gct atg cct cac 3519		
Phe Cys Arg Phe Ser Ile Ala Asp Thr Ala Ser Ala Met Pro His		
1160	1165	1170
tcg tac gag aat cga cac atc gtc cat cct act act ctg gac tcg 3564		
Ser Tyr Glu Asn Arg His Ile Val His Pro Thr Thr Leu Asp Ser		
1175	1180	1185
gtg atc cag gcg gca tac acg gtg tta ccc tac gcg gga aca cgt 3609		
Val Ile Gln Ala Ala Tyr Thr Val Leu Pro Tyr Ala Gly Thr Arg		
1190	1195	1200
atg aaa acg gcc atg gta cca agg agg cta aga aat gtc aaa ata 3654		
Met Lys Thr Ala Met Val Pro Arg Arg Leu Arg Asn Val Lys Ile		
1205	1210	1215
tcc tct agc ctg gct gac ttg gag gct ggt gat gct ctg gac gca 3699		
Ser Ser Ser Leu Ala Asp Leu Glu Ala Gly Asp Ala Leu Asp Ala		
1220	1225	1230
cag gcc agc atc aag gat cgc aac tct caa tcc ttc tct acc gac 3744		
Gln Ala Ser Ile Lys Asp Arg Asn Ser Gln Ser Phe Ser Thr Asp		
1235	1240	1245
ttg gca gtg ttt gat gac tat gat agc ggt tct tct ccc tcg gac 3789		
Leu Ala Val Phe Asp Asp Tyr Asp Ser Gly Ser Ser Pro Ser Asp		
1250	1255	1260

gga atc cca gtc ata gag att gaa ggc ctt gtt ttc cag tcg gtt  
3834

Gly Ile Pro Val Ile Glu Ile Glu Gly Leu Val Phe Gln Ser Val

1265

1270

1275

gga agc agc ttc tct gac caa aag tca gac tcc aac gac aca gaa  
3879

Gly Ser Ser Phe Ser Asp Gln Lys Ser Asp Ser Asn Asp Thr Glu

1280

1285

1290

aat gcc tgc agc tcc tgg gtt tgg gcc cct gac atc agc ttg ggt  
3924

Asn Ala Cys Ser Ser Trp Val Trp Ala Pro Asp Ile Ser Leu Gly

1295

1300

1305

gac tcc act tgg ctc aaa gaa aag ttg agc act gag gct gag acg  
3969

Asp Ser Thr Trp Leu Lys Glu Lys Leu Ser Thr Glu Ala Glu Thr

1310

1315

1320

aaa gaa acg gaa ctc atg atg gac ctc cga aga tgc acg atc aac  
4014

Lys Glu Thr Glu Leu Met Met Asp Leu Arg Arg Cys Thr Ile Asn

1325

1330

1335

ttt ata cag gag gct gtc act gat ttg aca aat tct gat atc caa  
4059

Phe Ile Gln Glu Ala Val Thr Asp Leu Thr Asn Ser Asp Ile Gln

1340

1345

1350

cat ctg gat ggc cac ctt cag aag tat ttc gat tgg atg aat gtc  
4104

His Leu Asp Gly His Leu Gln Lys Tyr Phe Asp Trp Met Asn Val

1355

1360

1365

caa ttg gac ctt gcg aga caa aac aag ctc agc cca gcc agt tgc  
4149

Gln Leu Asp Leu Ala Arg Gln Asn Lys Leu Ser Pro Ala Ser Cys

1370

1375

1380

gac tgg cta agt gac gat gct gag cag aag aaa tgc cta cag gcc  
4194

Asp Trp Leu Ser Asp Asp Ala Glu Gln Lys Lys Cys Leu Gln Ala

1385

1390

1395

aga gtc gct gga gaa agc gtc aat ggc gag atg att tct cgt cta  
4239

Arg Val Ala Gly Glu Ser Val Asn Gly Glu Met Ile Ser Arg Leu

1400

1405

1410

gga cct cag tta ata gca atg cta cgc cgc gaa aca gag cca ctt  
4284

Gly Pro Gln Leu Ile Ala Met Leu Arg Arg Glu Thr Glu Pro Leu

1415

1420

1425

gag ttg atg atg caa gat cag ctg cta agc aga tac tac gtc aac  
4329

Glu Leu Met Met Gln Asp Gln Leu Leu Ser Arg Tyr Tyr Val Asn

1430

1435

1440

gca atc aaa tgg agc cga tca aac gca caa gcc agc gag ctg atc  
4374

Ala Ile Lys Trp Ser Arg Ser Asn Ala Gln Ala Ser Glu Leu Ile

1445

1450

1455

cga ctt tgc gcc cac aag aac ccg cgt tct cgc att ttg gag att  
4419

Arg Leu Cys Ala His Lys Asn Pro Arg Ser Arg Ile Leu Glu Ile

1460

1465

1470

ggc gga ggc acg ggc ggc tgc aca aag ctt att gtc aat gca ttg

4464  
 Gly Gly Gly Thr Gly Gly Cys Thr Lys Leu Ile Val Asn Ala Leu  
 1475 1480 1485  
  
 gga aac acc aag ccg atc gat cgt tat gac ttc acc gat gtg tct  
 4509  
 Gly Asn Thr Lys Pro Ile Asp Arg Tyr Asp Phe Thr Asp Val Ser  
 1490 1495 1500  
  
 gcc ggg ttt ttc gag tcg gcg cgt gag caa ttt gcg gat tgg caa  
 4554  
 Ala Gly Phe Phe Glu Ser Ala Arg Glu Gln Phe Ala Asp Trp Gln  
 1505 1510 1515  
  
 gac gtg atg act ttc aaa aaa ttg gat att gaa agc gat ccc gag  
 4599  
 Asp Val Met Thr Phe Lys Lys Leu Asp Ile Glu Ser Asp Pro Glu  
 1520 1525 1530  
  
 caa caa ggg ttt gaa tgt gcc acc tac gat gtg gtc gtg gct tgc  
 4644  
 Gln Gln Gly Phe Glu Cys Ala Thr Tyr Asp Val Val Val Ala Cys  
 1535 1540 1545  
  
 cag gtc ctg cat gca act cga tgc atg aaa cga aca ctg agt aac  
 4689  
 Gln Val Leu His Ala Thr Arg Cys Met Lys Arg Thr Leu Ser Asn  
 1550 1555 1560  
  
 gtt cga aaa ttg ctc aag cct ggg ggc aac ttg att ttg gtt gag  
 4734  
 Val Arg Lys Leu Leu Lys Pro Gly Gly Asn Leu Ile Leu Val Glu  
 1565 1570 1575  
  
 act acc agg gat cag ctc gat ttg ttc ttt acc ttc gga ctg ttg  
 4779

Thr Thr	Arg Asp Gln Leu Asp	Leu Phe Phe Thr Phe	Gly Leu Leu
1580	1585	1590	
cca ggt 4824	tgg tgg ctc agt gag	gag cct gag cgg aag	tcg acg cca
Pro Gly	Trp Trp Leu Ser Glu	Glu Pro Glu Arg Lys	Ser Thr Pro
1595	1600	1605	
tcg ctc 4869	act acc gat ctt tgg	aac acc atg ttg gac	acg agc ggt
Ser Leu	Thr Thr Asp Leu Trp	Asn Thr Met Leu Asp	Thr Ser Gly
1610	1615	1620	
ttc aac 4914	ggg gtg gaa ttg gag	gtt cgt gat tgt gaa	gac gat gag
Phe Asn	Gly Val Glu Leu Glu	Val Arg Asp Cys Glu	Asp Asp Glu
1625	1630	1635	
ttt tac 4959	atg atc agc aca atg	cta tcg acg gct aga	aaa gag aat
Phe Tyr	Met Ile Ser Thr Met	Leu Ser Thr Ala Arg	Lys Glu Asn
1640	1645	1650	
aca acc 5004	ccg gat aca gtg gca	gaa tcg gag gtg ctt	ttg ctg cac
Thr Thr	Pro Asp Thr Val Ala	Glu Ser Glu Val Leu	Leu Leu His
1655	1660	1665	
gga gcg 5049	ctc cga cct cct tca	tct tgg ctg gaa agt	ctc cag gca
Gly Ala	Leu Arg Pro Pro Ser	Ser Trp Leu Glu Ser	Leu Gln Ala
1670	1675	1680	
gca att 5094	tgt gaa aag acc agt	tct agc cca tcg atc	aac gct ctg
Ala Ile	Cys Glu Lys Thr Ser	Ser Ser Pro Ser Ile	Asn Ala Leu



1685	1690	1695
ggc gag 5139 Gly Glu	gta gat acc act gga Val Asp Thr Thr Gly	agg aca tgc att ttt ctt ggg gaa Arg Thr Cys Ile Phe Leu Gly Glu
1700	1705	1710
atg gag 5184 Met Glu	tcc tcg ctc ctt gga Ser Ser Leu Leu Gly	gag gtg gga agc gag acc ttc aaa Glu Val Gly Ser Glu Thr Phe Lys
1715	1720	1725
tcc atc 5229 Ser Ile	acc gcg atg ctg aat Thr Ala Met Leu Asn	aac tgc aac gca ctt ctc tgg gtg Asn Cys Asn Ala Leu Leu Trp Val
1730	1735	1740
tct aga 5274 Ser Arg	gga gca gcc atg agc Gly Ala Ala Met Ser	tcc gag gat cca tgg aaa gct cta Ser Glu Asp Pro Trp Lys Ala Leu
1745	1750	1755
cat att 5319 His Ile	ggc ctg ctg cgt acc Gly Leu Leu Arg Thr	atc cgc aac gaa aat aac ggg aag Ile Arg Asn Glu Asn Asn Gly Lys
1760	1765	1770
gaa tat 5364 Glu Tyr	gta tcg ttg gat ctc Val Ser Leu Asp Leu	gat cct tct cga aac gca tac acc Asp Pro Ser Arg Asn Ala Tyr Thr
1775	1780	1785
cac gag 5409 His Glu	tcc ctg tat gct atc Ser Leu Tyr Ala Ile	tgc aat atc ttc aat ggc cgc ctc Cys Asn Ile Phe Asn Gly Arg Leu

1790	1795	1800
ggc gac 5454	ctt tcc gaa gac aag	gag ttt gaa ttt gca gag aga aac
Gly Asp	Leu Ser Glu Asp Lys	Glu Phe Glu Phe Ala Glu Arg Asn
1805	1810	1815
ggc gtc 5499	atc cac gta ccg cga	ctt ttc aat gac ccg cac tgg aag
Gly Val	Ile His Val Pro Arg	Leu Phe Asn Asp Pro His Trp Lys
1820	1825	1830
gac caa 5544	gaa gcg gtt gag gtc	aca ctg cag ccg ttc gag caa ccc
Asp Gln	Glu Ala Val Glu Val	Thr Leu Gln Pro Phe Glu Gln Pro
1835	1840	1845
ggg cgt 5589	cgt ctg cgg atg gag	gtt gag acg cca ggg ctc tta gac
Gly Arg	Arg Leu Arg Met Glu	Val Glu Thr Pro Gly Leu Leu Asp
1850	1855	1860
tcc ctg 5634	caa ttt cga gac gac	gaa gga cgt gaa ggc aag gat ctt
Ser Leu	Gln Phe Arg Asp Asp	Glu Gly Arg Glu Gly Lys Asp Leu
1865	1870	1875
ccg gat 5679	gat tgg gta gaa atc	gaa ccc aaa gct ttc ggt ctc aat
Pro Asp	Asp Trp Val Glu Ile	Glu Pro Lys Ala Phe Gly Leu Asn
1880	1885	1890
ttt cgg 5724	gat gtc atg gtt gcc	atg ggt caa ttg gag gcc aac cgt
Phe Arg	Asp Val Met Val Ala	Met Gly Gln Leu Glu Ala Asn Arg
1895	1900	1905

gtg atg ggc ttc gaa tgc gcc gga gtg atc aca aag ctc ggt gga  
5769

Val Met Gly Phe Glu Cys Ala Gly Val Ile Thr Lys Leu Gly Gly

1910

1915

1920

gct gct gcc gct agc caa ggc ctc aga tta ggg gac cgc gta tgt  
5814

Ala Ala Ala Ala Ser Gln Gly Leu Arg Leu Gly Asp Arg Val Cys

1925

1930

1935

gca cta ctg aaa ggc cat tgg gcg acc aga aca cag acg ccg tac  
5859

Ala Leu Leu Lys Gly His Trp Ala Thr Arg Thr Gln Thr Pro Tyr

1940

1945

1950

act aat gtc gtc cgt att ccg gac gaa atg ggc ttc cca gaa gcc  
5904

Thr Asn Val Val Arg Ile Pro Asp Glu Met Gly Phe Pro Glu Ala

1955

1960

1965

gct tcg gtc ccc ctg gct ttc act acc gca tat att gcg ctt tat  
5949

Ala Ser Val Pro Leu Ala Phe Thr Thr Ala Tyr Ile Ala Leu Tyr

1970

1975

1980

acc acg gca aag cta cga cga ggc gaa aga gtc ttg atc cac agt  
5994

Thr Thr Ala Lys Leu Arg Arg Gly Glu Arg Val Leu Ile His Ser

1985

1990

1995

gga gct gga ggc gtc ggt caa gca gcg atc att ttg tcc cag ctt  
6039

Gly Ala Gly Gly Val Gly Gln Ala Ala Ile Ile Leu Ser Gln Leu

2000

2005

2010

gcg ggt gcc gag gtc ttc gtc aca gcg gga act caa gcc aag cgt  
 6084  
 Ala Gly Ala Glu Val Phe Val Thr Ala Gly Thr Gln Ala Lys Arg

2015

2020

2025

gac ttt gtc ggc gat aaa ttc ggc atc aat ccg gat cat atc ttc  
 6129  
 Asp Phe Val Gly Asp Lys Phe Gly Ile Asn Pro Asp His Ile Phe

2030

2035

2040

tcg agc agg aat gac tta ttc gtc gac ggc atc aaa gcc tac acg  
 6174  
 Ser Ser Arg Asn Asp Leu Phe Val Asp Gly Ile Lys Ala Tyr Thr

2045

2050

2055

ggc gga ctt ggc gtt cat gtc gtt cta aac tca ttg gca ggt caa  
 6219  
 Gly Gly Leu Gly Val His Val Val Leu Asn Ser Leu Ala Gly Gln

2060

2065

2070

ctc ctc caa gca agc ttt gac tgc atg gcc gaa ttc ggc aga ttt  
 6264  
 Leu Leu Gln Ala Ser Phe Asp Cys Met Ala Glu Phe Gly Arg Phe

2075

2080

2085

gtt gag att gga aaa aag gac ctg gag caa aac agc aga ctt gac  
 6309  
 Val Glu Ile Gly Lys Lys Asp Leu Glu Gln Asn Ser Arg Leu Asp

2090

2095

2100

atg ctg cca ttc acc cgg gac gtc tct ttc aca tca att gat ctt  
 6354  
 Met Leu Pro Phe Thr Arg Asp Val Ser Phe Thr Ser Ile Asp Leu

2105

2110

2115

ctc tcg tgg caa aga gcc aaa agt gaa gaa gta tcc gaa gcg ttg

6399  
 Leu Ser Trp Gln Arg Ala Lys Ser Glu Glu Val Ser Glu Ala Leu  
 2120 2125 2130  
 aac cat gtc aca aaa ctc ctc gag aca aaa gcg att ggc ttg att  
 6444  
 Asn His Val Thr Lys Leu Leu Glu Thr Lys Ala Ile Gly Leu Ile  
 2135 2140 2145  
 ggt cca atc cag cag cac tcc ttg tca aac atc gag aag gcc ttc  
 6489  
 Gly Pro Ile Gln Gln His Ser Leu Ser Asn Ile Glu Lys Ala Phe  
 2150 2155 2160  
 cgt acg atg cag agt ggt cag cat gtt ggc aaa gtt gtg gtc aat  
 6534  
 Arg Thr Met Gln Ser Gly Gln His Val Gly Lys Val Val Val Asn  
 2165 2170 2175  
 gta tct ggg gac gaa ctg gtc cca gtc ggc gat gga ggg ttc tcg  
 6579  
 Val Ser Gly Asp Glu Leu Val Pro Val Gly Asp Gly Gly Phe Ser  
 2180 2185 2190  
 ctg aag ctg aag cct gac agt tct tac cta gtt gct ggt ggg ctg  
 6624  
 Leu Lys Leu Lys Pro Asp Ser Ser Tyr Leu Val Ala Gly Gly Leu  
 2195 2200 2205  
 ggg gga att gga aag cag atc tgt cag tgg ctt gtt gat cat ggc  
 6669  
 Gly Gly Ile Gly Lys Gln Ile Cys Gln Trp Leu Val Asp His Gly  
 2210 2215 2220  
 gcg aag cac ttg att atc cta tcg aga agt gca aag gcc agt cca  
 6714

Ala Lys His Leu Ile Ile Leu Ser Arg Ser Ala Lys Ala Ser Pro  
 2225 2230 2235

ttc ata acc agc ttg caa aat caa cag tgc gct gtc tat cta cac  
 6759  
 Phe Ile Thr Ser Leu Gln Asn Gln Gln Cys Ala Val Tyr Leu His  
 2240 2245 2250

gca tgt gac atc tca gat caa gat cag gtc acc aag gtg ctc cgg  
 6804  
 Ala Cys Asp Ile Ser Asp Gln Asp Gln Val Thr Lys Val Leu Arg  
 2255 2260 2265

ttg tgc gaa gaa gca cat gca ccg cca att cga ggt atc ata caa  
 6849  
 Leu Cys Glu Glu Ala His Ala Pro Pro Ile Arg Gly Ile Ile Gln  
 2270 2275 2280

ggt gcc atg gtt ctc aag gac gcg ctt cta tcg cga atg aca ttg  
 6894  
 Gly Ala Met Val Leu Lys Asp Ala Leu Leu Ser Arg Met Thr Leu  
 2285 2290 2295

gat gaa ttt aat gca gca aca cgc cca aaa gta cag ggt agt tgg  
 6939  
 Asp Glu Phe Asn Ala Ala Thr Arg Pro Lys Val Gln Gly Ser Trp  
 2300 2305 2310

tat ctt cac aag atc gca cag gat gtt gac ttc ttc gtg atg ctc  
 6984  
 Tyr Leu His Lys Ile Ala Gln Asp Val Asp Phe Phe Val Met Leu  
 2315 2320 2325

tca tcc ctt gtt ggg gtc atg ggt ggg gca ggc cag gcc aat tac  
 7029  
 Ser Ser Leu Val Gly Val Met Gly Gly Ala Gly Gln Ala Asn Tyr



2330	2335	2340
gca gct gct ggt gca ttc cag gac gca ctt gcg cac cac cgg aga		
7074		
Ala Ala Ala Gly Ala Phe Gln Asp Ala Leu Ala His His Arg Arg		
2345	2350	2355
gcc cat ggc atg ccg gct gtc acc att gac ttg ggc atg gtc aag		
7119		
Ala His Gly Met Pro Ala Val Thr Ile Asp Leu Gly Met Val Lys		
2360	2365	2370
tct gtt gga tac gtg gct gaa act ggc cgt ggt gtg gcc gac cgg		
7164		
Ser Val Gly Tyr Val Ala Glu Thr Gly Arg Gly Val Ala Asp Arg		
2375	2380	2385
ctc gct aga ata ggt tac aag cct atg cat gaa aag gac gtc atg		
7209		
Leu Ala Arg Ile Gly Tyr Lys Pro Met His Glu Lys Asp Val Met		
2390	2395	2400
gat gtg ttg gag aag gca atc ctg tgt tct tcc cct caa ttt cca		
7254		
Asp Val Leu Glu Lys Ala Ile Leu Cys Ser Ser Pro Gln Phe Pro		
2405	2410	2415
tca cct ccc gca gct gtg gtt aca gga atc aac aca tcc ccg ggt		
7299		
Ser Pro Pro Ala Ala Val Val Thr Gly Ile Asn Thr Ser Pro Gly		
2420	2425	2430
gct cac tgg acc gag gca aac tgg ata cag gaa cag cgg ttt gtg		
7344		
Ala His Trp Thr Glu Ala Asn Trp Ile Gln Glu Gln Arg Phe Val		

2435	2440	2445
gga ctt    aaa tac cgc caa gtc    ctt cat gca gac caa    tcc ttt gtc		
7389		
Gly Leu    Lys Tyr Arg Gln Val    Leu His Ala Asp Gln    Ser Phe Val		
2450	2455	2460
tct tcg    cat aaa aaa gga cca    gat ggc gtg cgg gcc    caa cta agc		
7434		
Ser Ser    His Lys Lys Gly Pro    Asp Gly Val Arg Ala    Gln Leu Ser		
2465	2470	2475
agg gtc    acc tct cac gac gag    gcc att tct atc gtc    ctc aaa gca		
7479		
Arg Val    Thr Ser His Asp Glu    Ala Ile Ser Ile Val    Leu Lys Ala		
2480	2485	2490
atg acg    gaa aag ctg atg cga    atg ttt ggt ctg gca    gaa gac gac		
7524		
Met Thr    Glu Lys Leu Met Arg    Met Phe Gly Leu Ala    Glu Asp Asp		
2495	2500	2505
atg tcc    tcg tcc aaa aac ctg    gca ggt gtc ggc gta    gac tca ctc		
7569		
Met Ser    Ser Ser Lys Asn Leu    Ala Gly Val Gly Val    Asp Ser Leu		
2510	2515	2520
gtc gcc    att gaa ctt cga aac    tgg atc aca tct gaa    atc cat gtt		
7614		
Val Ala    Ile Glu Leu Arg Asn    Trp Ile Thr Ser Glu    Ile His Val		
2525	2530	2535
gat gtg    tcg atc ttt gag ctc    atg aat ggt aac acc    atc gcc ggc		
7659		
Asp Val    Ser Ile Phe Glu Leu    Met Asn Gly Asn Thr    Ile Ala Gly		
2540	2545	2550

ctc gtc gag tta gtt gtg gcg aaa tgc agt taa

7692

Leu Val Glu Leu Val Val Ala Lys Cys Ser

2555

2560

<210> 46

<211> 2563

<212> PRT

<213> Penicillium citrinum

<400> 46

Met Asn Asn Thr Pro Ala Val Thr Ala Thr Ala Thr Ala Thr  
1 5 10 15

Ala Thr Ala Met Ala Gly Ser Ala Cys Ser Asn Thr Ser Thr Pro Ile  
20 25 30

Ala Ile Val Gly Met Gly Cys Arg Phe Ala Gly Asp Ala Thr Ser Pro  
35 40 45

Gln Lys Leu Trp Glu Met Val Glu Arg Gly Gly Ser Ala Trp Ser Lys  
50 55 60

Val Pro Ser Ser Arg Phe Asn Val Arg Gly Val Tyr His Pro Asn Gly  
65 70 75 80

Glu Arg Val Gly Ser Thr His Val Lys Gly Gly His Phe Ile Asp Glu  
85 90 95

Asp Pro Ala Leu Phe Asp Ala Ala Phe Phe Asn Met Thr Thr Glu Val  
100 105 110

Ala Ser Cys Met Asp Pro Gln Tyr Arg Leu Met Leu Glu Val Val Tyr  
 115 120 125

Glu Ser Leu Glu Ser Ala Gly Ile Thr Ile Asp Gly Met Ala Gly Ser  
 130 135 140

Asn Thr Ser Val Phe Gly Gly Val Met Tyr His Asp Tyr Gln Asp Ser  
 145 150 155 160

Leu Asn Arg Asp Pro Glu Thr Val Pro Arg Tyr Phe Ile Thr Gly Asn  
 165 170 175

Ser Gly Thr Met Leu Ser Asn Arg Ile Ser His Phe Tyr Asp Leu Arg  
 180 185 190

Gly Pro Ser Val Thr Val Asp Thr Ala Cys Ser Thr Thr Leu Thr Ala  
 195 200 205

Leu His Leu Ala Cys Gln Ser Leu Arg Thr Gly Glu Ser Asp Thr Ala  
 210 215 220

Ile Val Ile Gly Ala Asn Leu Leu Leu Asn Pro Asp Val Phe Val Thr  
 225 230 235 240

Met Ser Asn Leu Gly Phe Leu Ser Pro Asp Gly Ile Ser Tyr Ser Phe  
 245 250 255

Asp Pro Arg Ala Asn Gly Tyr Gly Arg Gly Glu Gly Ile Ala Ala Leu  
 260 265 270

Val Ile Lys Ala Leu Pro Asn Ala Leu Arg Asp Gln Asp Pro Ile Arg  
 275 280 285

Ala Val Ile Arg Glu Thr Ala Leu Asn Gln Asp Gly Lys Thr Pro Ala  
 290 295 300

Ile Thr Ala Pro Ser Asp Val Ala Gln Lys Ser Leu Ile Gln Glu Cys  
 305 310 315 320

Tyr Asp Lys Ala Gly Leu Asp Met Ser Leu Thr Ser Tyr Val Glu Ala  
                                   325                                  330                                  335

His Gly Thr Gly Thr Pro Thr Gly Asp Pro Leu Glu Ile Ser Ala Ile  
                                   340                                  345                                  350

Ser Ala Ala Phe Lys Gly His Pro Leu His Leu Gly Ser Val Lys Ala  
                                   355                                  360                                  365

Asn Ile Gly His Thr Glu Ala Ala Ser Gly Leu Ala Ser Ile Ile Lys  
                                   370                                  375                                  380

Val Ala Leu Ala Leu Glu Lys Gly Leu Ile Pro Pro Asn Ala Arg Phe  
                                   385                                  390                                  395                                  400

Leu Gln Lys Asn Ser Lys Leu Met Leu Asp Gln Lys Asn Ile Lys Ile  
                                   405                                  410                                  415

Pro Met Ser Ala Gln Asp Trp Pro Val Lys Asp Gly Thr Arg Arg Ala  
                                   420                                  425                                  430

Ser Val Asn Asn Phe Gly Phe Gly Gly Ser Asn Ala His Val Ile Leu  
                                   435                                  440                                  445

Glu Ser Tyr Asp Arg Ala Ser Leu Ala Leu Pro Glu Asp Gln Val His  
                                   450                                  455                                  460

Val Asn Gly Asn Ser Glu His Gly Arg Val Glu Asp Gly Ser Lys Gln  
                                   465                                  470                                  475                                  480

Ser Arg Ile Tyr Val Val Arg Ala Lys Asp Glu Gln Ala Cys Arg Arg  
                                   485                                  490                                  495

Thr Ile Ala Ser Leu Arg Asp Tyr Ile Lys Ser Val Ala Asp Ile Asp  
                                   500                                  505                                  510

Gly Glu Pro Phe Leu Ala Ser Leu Ala Tyr Thr Leu Gly Ser Arg Arg

515					520					525					
Ser	Ile	Leu	Pro	Trp	Thr	Ser	Val	Tyr	Val	Ala	Asp	Ser	Leu	Gly	Gly
	530					535					540				
Leu	Val	Ser	Ala	Leu	Ser	Asp	Glu	Ser	Asn	Gln	Pro	Lys	Arg	Ala	Asn
545					550					555					560
Glu	Lys	Val	Arg	Leu	Gly	Phe	Val	Phe	Thr	Gly	Gln	Gly	Ala	Gln	Trp
				565					570					575	
His	Ala	Met	Gly	Arg	Glu	Leu	Val	Asn	Thr	Phe	Pro	Val	Phe	Lys	Gln
			580					585					590		
Ala	Ile	Leu	Glu	Cys	Asp	Gly	Tyr	Ile	Lys	Gln	Leu	Gly	Ala	Ser	Trp
		595					600					605			
Asn	Phe	Met	Glu	Glu	Leu	His	Arg	Asp	Glu	Leu	Thr	Thr	Arg	Val	Asn
	610					615					620				
Asp	Ala	Glu	Tyr	Ser	Leu	Pro	Leu	Ser	Thr	Ala	Ile	Gln	Ile	Ala	Leu
625					630					635					640
Val	Arg	Leu	Leu	Trp	Ser	Trp	Gly	Ile	Arg	Pro	Thr	Gly	Ile	Thr	Ser
				645					650					655	
His	Ser	Ser	Gly	Glu	Ala	Ala	Ala	Ala	Tyr	Ala	Ala	Gly	Ala	Leu	Ser
			660					665					670		
Ala	Arg	Ser	Ala	Ile	Gly	Ile	Thr	Tyr	Ile	Arg	Gly	Val	Leu	Thr	Thr
			675				680					685			
Lys	Pro	Lys	Pro	Ala	Leu	Ala	Ala	Lys	Gly	Gly	Met	Met	Ala	Val	Gly
	690					695					700				
Leu	Gly	Arg	Ser	Glu	Thr	Asn	Val	Tyr	Ile	Ser	Arg	Leu	Asn	Gln	Glu
705					710					715					720



Asp Gly Cys Val Val Val Gly Cys Ile Asn Ser Gln Cys Ser Val Thr  
725 730 735

Val Ser Gly Asp Leu Gly Ala Ile Glu Lys Leu Glu Lys Leu Leu His  
740 745 750

Ala Asp Gly Ile Phe Thr Arg Lys Leu Lys Val Thr Glu Ala Phe His  
755 760 765

Ser Ser His Met Arg Pro Met Ala Asp Ala Phe Gly Ala Ser Leu Arg  
770 775 780

Asp Leu Phe Asn Ser Asp Asn Asn Asn Asp Asn Pro Asn Ala Asp Thr  
785 790 795 800

Ser Lys Gly Val Leu Tyr Ser Ser Pro Lys Thr Gly Ser Arg Met Thr  
805 810 815

Asp Leu Lys Leu Leu Leu Asp Pro Thr His Trp Met Asp Ser Met Leu  
820 825 830

Gln Pro Val Glu Phe Glu Ser Ser Leu Arg Glu Met Cys Phe Asp Pro  
835 840 845

Asn Thr Lys Glu Lys Ala Val Asp Val Ile Ile Glu Ile Gly Pro His  
850 855 860

Gly Ala Leu Gly Gly Pro Ile Asn Gln Val Met Gln Asp Leu Gly Leu  
865 870 875 880

Lys Gly Thr Asp Ile Asn Tyr Leu Ser Cys Leu Ser Arg Gly Arg Ser  
885 890 895

Ser Leu Glu Thr Met Tyr Arg Ala Ala Thr Glu Leu Ile Ser Lys Gly  
900 905 910

Tyr Gly Leu Lys Met Asp Ala Ile Asn Phe Pro His Gly Arg Lys Glu  
915 920 925

Pro Arg Val Lys Val Leu Ser Asp Leu Pro Ala Tyr Pro Trp Asn His  
 930 935 940

Gln Thr Arg Tyr Trp Arg Glu Pro Arg Gly Ser Arg Glu Ser Lys Gln  
 945 950 955 960

Arg Thr His Pro Pro His Thr Leu Ile Gly Ser Arg Glu Ser Leu Ser  
 965 970 975

Pro His Phe Ala Pro Lys Trp Lys His Val Leu Arg Leu Ser Asp Ile  
 980 985 990

Pro Trp Ile Arg Asp His Val Val Gly Ser Ser Ile Ile Phe Pro Gly  
 995 1000 1005

Ala Gly Phe Ile Ser Met Ala Ile Glu Gly Phe Ser Gln Val Cys  
 1010 1015 1020

Pro Pro Val Ala Gly Ala Ser Ile Asn Tyr Asn Leu Arg Asp Val  
 1025 1030 1035

Glu Leu Ala Gln Ala Leu Ile Ile Pro Ala Asp Ala Glu Ala Glu  
 1040 1045 1050

Val Asp Leu Arg Leu Thr Ile Arg Ser Cys Glu Glu Arg Ser Leu  
 1055 1060 1065

Gly Thr Lys Asn Trp His Gln Phe Ser Val His Ser Ile Ser Gly  
 1070 1075 1080

Glu Asn Asn Thr Trp Thr Glu His Cys Thr Gly Leu Ile Arg Ser  
 1085 1090 1095

Glu Ser Glu Arg Ser His Leu Asp Cys Ser Thr Val Glu Ala Ser  
 1100 1105 1110

Arg Arg Leu Asn Leu Gly Ser Asp Asn Arg Ser Ile Asp Pro Asn

1115						1120						1125					
Asp	Leu	Trp	Glu	Ser	Leu	His	Ala	Asn	Gly	Ile	Cys	His	Gly	Pro			
1130						1135						1140					
Ile	Phe	Gln	Asn	Ile	Gln	Arg	Ile	Gln	Asn	Asn	Gly	Gln	Gly	Ser			
1145						1150						1155					
Phe	Cys	Arg	Phe	Ser	Ile	Ala	Asp	Thr	Ala	Ser	Ala	Met	Pro	His			
1160						1165						1170					
Ser	Tyr	Glu	Asn	Arg	His	Ile	Val	His	Pro	Thr	Thr	Leu	Asp	Ser			
1175						1180						1185					
Val	Ile	Gln	Ala	Ala	Tyr	Thr	Val	Leu	Pro	Tyr	Ala	Gly	Thr	Arg			
1190						1195						1200					
Met	Lys	Thr	Ala	Met	Val	Pro	Arg	Arg	Leu	Arg	Asn	Val	Lys	Ile			
1205						1210						1215					
Ser	Ser	Ser	Leu	Ala	Asp	Leu	Glu	Ala	Gly	Asp	Ala	Leu	Asp	Ala			
1220						1225						1230					
Gln	Ala	Ser	Ile	Lys	Asp	Arg	Asn	Ser	Gln	Ser	Phe	Ser	Thr	Asp			
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Leu	Ala	Val	Phe	Asp	Asp	Tyr	Asp	Ser	Gly	Ser	Ser	Pro	Ser	Asp			
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Gly	Ile	Pro	Val	Ile	Glu	Ile	Glu	Gly	Leu	Val	Phe	Gln	Ser	Val			
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1280						1285						1290					
Asn	Ala	Cys	Ser	Ser	Trp	Val	Trp	Ala	Pro	Asp	Ile	Ser	Leu	Gly			
1295						1300						1305					

Asp Ser Thr Trp Leu Lys Glu Lys Leu Ser Thr Glu Ala Glu Thr  
 1310 1315 1320

Lys Glu Thr Glu Leu Met Met Asp Leu Arg Arg Cys Thr Ile Asn  
 1325 1330 1335

Phe Ile Gln Glu Ala Val Thr Asp Leu Thr Asn Ser Asp Ile Gln  
 1340 1345 1350

His Leu Asp Gly His Leu Gln Lys Tyr Phe Asp Trp Met Asn Val  
 1355 1360 1365

Gln Leu Asp Leu Ala Arg Gln Asn Lys Leu Ser Pro Ala Ser Cys  
 1370 1375 1380

Asp Trp Leu Ser Asp Asp Ala Glu Gln Lys Lys Cys Leu Gln Ala  
 1385 1390 1395

Arg Val Ala Gly Glu Ser Val Asn Gly Glu Met Ile Ser Arg Leu  
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Gly Pro Gln Leu Ile Ala Met Leu Arg Arg Glu Thr Glu Pro Leu  
 1415 1420 1425

Glu Leu Met Met Gln Asp Gln Leu Leu Ser Arg Tyr Tyr Val Asn  
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Ala Ile Lys Trp Ser Arg Ser Asn Ala Gln Ala Ser Glu Leu Ile  
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Arg Leu Cys Ala His Lys Asn Pro Arg Ser Arg Ile Leu Glu Ile  
 1460 1465 1470

Gly Gly Gly Thr Gly Gly Cys Thr Lys Leu Ile Val Asn Ala Leu  
 1475 1480 1485

Gly Asn Thr Lys Pro Ile Asp Arg Tyr Asp Phe Thr Asp Val Ser  
 1490 1495 1500

Ala	Gly	Phe	Phe	Glu	Ser	Ala	Arg	Glu	Gln	Phe	Ala	Asp	Trp	Gln
1505						1510					1515			
Asp	Val	Met	Thr	Phe	Lys	Lys	Leu	Asp	Ile	Glu	Ser	Asp	Pro	Glu
1520						1525					1530			
Gln	Gln	Gly	Phe	Glu	Cys	Ala	Thr	Tyr	Asp	Val	Val	Val	Ala	Cys
1535						1540					1545			
Gln	Val	Leu	His	Ala	Thr	Arg	Cys	Met	Lys	Arg	Thr	Leu	Ser	Asn
1550						1555					1560			
Val	Arg	Lys	Leu	Leu	Lys	Pro	Gly	Gly	Asn	Leu	Ile	Leu	Val	Glu
1565						1570					1575			
Thr	Thr	Arg	Asp	Gln	Leu	Asp	Leu	Phe	Phe	Thr	Phe	Gly	Leu	Leu
1580						1585					1590			
Pro	Gly	Trp	Trp	Leu	Ser	Glu	Glu	Pro	Glu	Arg	Lys	Ser	Thr	Pro
1595						1600					1605			
Ser	Leu	Thr	Thr	Asp	Leu	Trp	Asn	Thr	Met	Leu	Asp	Thr	Ser	Gly
1610						1615					1620			
Phe	Asn	Gly	Val	Glu	Leu	Glu	Val	Arg	Asp	Cys	Glu	Asp	Asp	Glu
1625						1630					1635			
Phe	Tyr	Met	Ile	Ser	Thr	Met	Leu	Ser	Thr	Ala	Arg	Lys	Glu	Asn
1640						1645					1650			
Thr	Thr	Pro	Asp	Thr	Val	Ala	Glu	Ser	Glu	Val	Leu	Leu	Leu	His
1655						1660					1665			
Gly	Ala	Leu	Arg	Pro	Pro	Ser	Ser	Trp	Leu	Glu	Ser	Leu	Gln	Ala
1670						1675					1680			
Ala	Ile	Cys	Glu	Lys	Thr	Ser	Ser	Ser	Pro	Ser	Ile	Asn	Ala	Leu

1685		1690		1695
Gly Glu Val Asp Thr Thr	Gly Arg Thr Cys Ile Phe	Leu Gly Glu		
1700	1705	1710		
Met Glu Ser Ser Leu Leu	Gly Glu Val Gly Ser	Glu Thr Phe Lys		
1715	1720	1725		
Ser Ile Thr Ala Met Leu	Asn Asn Cys Asn Ala	Leu Leu Trp Val		
1730	1735	1740		
Ser Arg Gly Ala Ala Met	Ser Ser Glu Asp Pro	Trp Lys Ala Leu		
1745	1750	1755		
His Ile Gly Leu Leu Arg	Thr Ile Arg Asn Glu	Asn Asn Gly Lys		
1760	1765	1770		
Glu Tyr Val Ser Leu Asp	Leu Asp Pro Ser Arg	Asn Ala Tyr Thr		
1775	1780	1785		
His Glu Ser Leu Tyr Ala	Ile Cys Asn Ile Phe	Asn Gly Arg Leu		
1790	1795	1800		
Gly Asp Leu Ser Glu Asp	Lys Glu Phe Glu Phe	Ala Glu Arg Asn		
1805	1810	1815		
Gly Val Ile His Val Pro	Arg Leu Phe Asn Asp	Pro His Trp Lys		
1820	1825	1830		
Asp Gln Glu Ala Val Glu	Val Thr Leu Gln Pro	Phe Glu Gln Pro		
1835	1840	1845		
Gly Arg Arg Leu Arg Met	Glu Val Glu Thr Pro	Gly Leu Leu Asp		
1850	1855	1860		
Ser Leu Gln Phe Arg Asp	Asp Glu Gly Arg Glu	Gly Lys Asp Leu		
1865	1870	1875		



Pro Asp Asp Trp Val Glu Ile Glu Pro Lys Ala Phe Gly Leu Asn  
1880 1885 1890

Phe Arg Asp Val Met Val Ala Met Gly Gln Leu Glu Ala Asn Arg  
1895 1900 1905

Val Met Gly Phe Glu Cys Ala Gly Val Ile Thr Lys Leu Gly Gly  
1910 1915 1920

Ala Ala Ala Ala Ser Gln Gly Leu Arg Leu Gly Asp Arg Val Cys  
1925 1930 1935

Ala Leu Leu Lys Gly His Trp Ala Thr Arg Thr Gln Thr Pro Tyr  
1940 1945 1950

Thr Asn Val Val Arg Ile Pro Asp Glu Met Gly Phe Pro Glu Ala  
1955 1960 1965

Ala Ser Val Pro Leu Ala Phe Thr Thr Ala Tyr Ile Ala Leu Tyr  
1970 1975 1980

Thr Thr Ala Lys Leu Arg Arg Gly Glu Arg Val Leu Ile His Ser  
1985 1990 1995

Gly Ala Gly Gly Val Gly Gln Ala Ala Ile Ile Leu Ser Gln Leu  
2000 2005 2010

Ala Gly Ala Glu Val Phe Val Thr Ala Gly Thr Gln Ala Lys Arg  
2015 2020 2025

Asp Phe Val Gly Asp Lys Phe Gly Ile Asn Pro Asp His Ile Phe  
2030 2035 2040

Ser Ser Arg Asn Asp Leu Phe Val Asp Gly Ile Lys Ala Tyr Thr  
2045 2050 2055

Gly Gly Leu Gly Val His Val Val Leu Asn Ser Leu Ala Gly Gln  
2060 2065 2070

Leu	Leu	Gln	Ala	Ser	Phe	Asp	Cys	Met	Ala	Glu	Phe	Gly	Arg	Phe
2075						2080					2085			
Val	Glu	Ile	Gly	Lys	Lys	Asp	Leu	Glu	Gln	Asn	Ser	Arg	Leu	Asp
2090						2095					2100			
Met	Leu	Pro	Phe	Thr	Arg	Asp	Val	Ser	Phe	Thr	Ser	Ile	Asp	Leu
2105						2110					2115			
Leu	Ser	Trp	Gln	Arg	Ala	Lys	Ser	Glu	Glu	Val	Ser	Glu	Ala	Leu
2120						2125					2130			
Asn	His	Val	Thr	Lys	Leu	Leu	Glu	Thr	Lys	Ala	Ile	Gly	Leu	Ile
2135						2140					2145			
Gly	Pro	Ile	Gln	Gln	His	Ser	Leu	Ser	Asn	Ile	Glu	Lys	Ala	Phe
2150						2155					2160			
Arg	Thr	Met	Gln	Ser	Gly	Gln	His	Val	Gly	Lys	Val	Val	Val	Asn
2165						2170					2175			
Val	Ser	Gly	Asp	Glu	Leu	Val	Pro	Val	Gly	Asp	Gly	Gly	Phe	Ser
2180						2185					2190			
Leu	Lys	Leu	Lys	Pro	Asp	Ser	Ser	Tyr	Leu	Val	Ala	Gly	Gly	Leu
2195						2200					2205			
Gly	Gly	Ile	Gly	Lys	Gln	Ile	Cys	Gln	Trp	Leu	Val	Asp	His	Gly
2210						2215					2220			
Ala	Lys	His	Leu	Ile	Ile	Leu	Ser	Arg	Ser	Ala	Lys	Ala	Ser	Pro
2225						2230					2235			
Phe	Ile	Thr	Ser	Leu	Gln	Asn	Gln	Gln	Cys	Ala	Val	Tyr	Leu	His
2240						2245					2250			
Ala	Cys	Asp	Ile	Ser	Asp	Gln	Asp	Gln	Val	Thr	Lys	Val	Leu	Arg

2255							2260					2265			
Leu	Cys	Glu	Glu	Ala	His	Ala	Pro	Pro	Ile	Arg	Gly	Ile	Ile	Gln	
2270						2275					2280				
Gly	Ala	Met	Val	Leu	Lys	Asp	Ala	Leu	Leu	Ser	Arg	Met	Thr	Leu	
2285						2290					2295				
Asp	Glu	Phe	Asn	Ala	Ala	Thr	Arg	Pro	Lys	Val	Gln	Gly	Ser	Trp	
2300						2305					2310				
Tyr	Leu	His	Lys	Ile	Ala	Gln	Asp	Val	Asp	Phe	Phe	Val	Met	Leu	
2315						2320					2325				
Ser	Ser	Leu	Val	Gly	Val	Met	Gly	Gly	Ala	Gly	Gln	Ala	Asn	Tyr	
2330						2335					2340				
Ala	Ala	Ala	Gly	Ala	Phe	Gln	Asp	Ala	Leu	Ala	His	His	Arg	Arg	
2345						2350					2355				
Ala	His	Gly	Met	Pro	Ala	Val	Thr	Ile	Asp	Leu	Gly	Met	Val	Lys	
2360						2365					2370				
Ser	Val	Gly	Tyr	Val	Ala	Glu	Thr	Gly	Arg	Gly	Val	Ala	Asp	Arg	
2375						2380					2385				
Leu	Ala	Arg	Ile	Gly	Tyr	Lys	Pro	Met	His	Glu	Lys	Asp	Val	Met	
2390						2395					2400				
Asp	Val	Leu	Glu	Lys	Ala	Ile	Leu	Cys	Ser	Ser	Pro	Gln	Phe	Pro	
2405						2410					2415				
Ser	Pro	Pro	Ala	Ala	Val	Val	Thr	Gly	Ile	Asn	Thr	Ser	Pro	Gly	
2420						2425					2430				
Ala	His	Trp	Thr	Glu	Ala	Asn	Trp	Ile	Gln	Glu	Gln	Arg	Phe	Val	
2435						2440					2445				

Gly Leu Lys Tyr Arg Gln Val Leu His Ala Asp Gln Ser Phe Val  
 2450 2455 2460

Ser Ser His Lys Lys Gly Pro Asp Gly Val Arg Ala Gln Leu Ser  
 2465 2470 2475

Arg Val Thr Ser His Asp Glu Ala Ile Ser Ile Val Leu Lys Ala  
 2480 2485 2490

Met Thr Glu Lys Leu Met Arg Met Phe Gly Leu Ala Glu Asp Asp  
 2495 2500 2505

Met Ser Ser Ser Lys Asn Leu Ala Gly Val Gly Val Asp Ser Leu  
 2510 2515 2520

Val Ala Ile Glu Leu Arg Asn Trp Ile Thr Ser Glu Ile His Val  
 2525 2530 2535

Asp Val Ser Ile Phe Glu Leu Met Asn Gly Asn Thr Ile Ala Gly  
 2540 2545 2550

Leu Val Glu Leu Val Val Ala Lys Cys Ser  
 2555 2560

<210> 47

<211> 1557

<212> DNA

<213> *Penicillium citrinum*

<220>

<221> CDS

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48

Met Leu Gly Gln Val Leu Leu Thr Val Glu Ser Tyr Gln Trp Val Ser

1

5

10

15

acc cct caa gcc ctt gtg gcg gtc gca gtg ctt ctt agt ctc atc gcc

96

Thr Pro Gln Ala Leu Val Ala Val Ala Val Leu Leu Ser Leu Ile Ala

20

25

30

tac cgt ttg cgg ggg cgc cag tcc gaa ctg caa gtc tat aat ccc aaa

144

Tyr Arg Leu Arg Gly Arg Gln Ser Glu Leu Gln Val Tyr Asn Pro Lys

35

40

45

aaa tgg tgg gag ttg acg acc atg agg gct agg cag gac ttc gat acg

192

Lys Trp Trp Glu Leu Thr Thr Met Arg Ala Arg Gln Asp Phe Asp Thr

50

55

60

tat ggt ccg agc tgg atc gaa gct tgg ttc tcg aaa aac gac aag ccc

240

Tyr Gly Pro Ser Trp Ile Glu Ala Trp Phe Ser Lys Asn Asp Lys Pro

65

70

75

80

ctg cgc ttc att gtt gat tcc ggc tat tgc acc atc ctc cca tcg tcc

288

Leu Arg Phe Ile Val Asp Ser Gly Tyr Cys Thr Ile Leu Pro Ser Ser

85

90

95

atg gcc gac gag ttt cgg aaa atc aaa gat atg tgc atg tac aag ttt

336

Met Ala Asp Glu Phe Arg Lys Ile Lys Asp Met Cys Met Tyr Lys Phe

100

105

110

ttg gcg gat gac ttt cac tct cat ctc cct gga ttc gac ggg ttc aag  
384

Leu Ala Asp Asp Phe His Ser His Leu Pro Gly Phe Asp Gly Phe Lys

115

120

125

gaa atc tgc cag gat gca cat ctt gtc aac aaa gtt gtt ttg aac cag  
432

Glu Ile Cys Gln Asp Ala His Leu Val Asn Lys Val Val Leu Asn Gln

130

135

140

tta caa acc caa gcc ccc aag tac aca aag cca ttg gct acc ttg gcc  
480

Leu Gln Thr Gln Ala Pro Lys Tyr Thr Lys Pro Leu Ala Thr Leu Ala

145

150

155

160

gac gct act att gcc aag ttg ttc ggt aaa agc gag gag tgg caa acc  
528

Asp Ala Thr Ile Ala Lys Leu Phe Gly Lys Ser Glu Glu Trp Gln Thr

165

170

175

gca cct gtc tat tcc aat gga ttg gac ctt gtc aca cga aca gtc aca  
576

Ala Pro Val Tyr Ser Asn Gly Leu Asp Leu Val Thr Arg Thr Val Thr

180

185

190

ctc att atg gtc ggc gac aaa atc tgc cac aat gag gag tgg ctg gat  
624

Leu Ile Met Val Gly Asp Lys Ile Cys His Asn Glu Glu Trp Leu Asp

195

200

205

att gca aag aac cat gcc gtg agt gtg gcg gta caa gct cgc caa ctt  
672

Ile Ala Lys Asn His Ala Val Ser Val Ala Val Gln Ala Arg Gln Leu

210

215

220

cgc gta tgg ccc atg cta ctg cga ccg ctc gct cac tgg ttt caa ccg



720

Arg Val Trp Pro Met Leu Leu Arg Pro Leu Ala His Trp Phe Gln Pro

225

230

235

240

caa gga cgc aaa ttg cgt gac caa gtg cgc cgc gca cga aag atc att

768

Gln Gly Arg Lys Leu Arg Asp Gln Val Arg Arg Ala Arg Lys Ile Ile

245

250

255

gat cct gag att cag cga cga cgt gct gaa aag gcc gca tgt gta gcg

816

Asp Pro Glu Ile Gln Arg Arg Arg Ala Glu Lys Ala Ala Cys Val Ala

260

265

270

aag ggc gtg cag ccg ccc cag tac gtc gat acc atg caa tgg ttt gaa

864

Lys Gly Val Gln Pro Pro Gln Tyr Val Asp Thr Met Gln Trp Phe Glu

275

280

285

gac acc gcc gac ggc cgc tgg tac gat gtg gcg ggt gct cag ctc gct

912

Asp Thr Ala Asp Gly Arg Trp Tyr Asp Val Ala Gly Ala Gln Leu Ala

290

295

300

atg gat ttc gcc ggc atc tac gcc tcg acg gat ctt ttc gtc ggt gcc

960

Met Asp Phe Ala Gly Ile Tyr Ala Ser Thr Asp Leu Phe Val Gly Ala

305

310

315

320

ctt gtg gac att gcc agg cac cca gac ctt att cag cct ctc cgc caa

1008

Leu Val Asp Ile Ala Arg His Pro Asp Leu Ile Gln Pro Leu Arg Gln

325

330

335

gag atc cgc act gta atc gga gaa ggg ggc tgg acg cct gcc tct ctg

1056

Glu Ile Arg Thr Val Ile Gly Glu Gly Gly Trp Thr Pro Ala Ser Leu

340

345

350

ttc aag ctg aag ctc ctc gac agc tgc atg aaa gag acg cag cga atc

1104

Phe Lys Leu Lys Leu Leu Asp Ser Cys Met Lys Glu Thr Gln Arg Ile

355

360

365

aag ccg gtc gag tgc gcc act atg cgc agt acc gct ctc aga gac atc

1152

Lys Pro Val Glu Cys Ala Thr Met Arg Ser Thr Ala Leu Arg Asp Ile

370

375

380

act cta tcc aat ggc ctc ttc att ccc aag ggc gag ttg gcc gct gtg

1200

Thr Leu Ser Asn Gly Leu Phe Ile Pro Lys Gly Glu Leu Ala Ala Val

385

390

395

400

gct gca gac cgc atg aac aac cct gat gtg tgg gaa aac ccc gaa aat

1248

Ala Ala Asp Arg Met Asn Asn Pro Asp Val Trp Glu Asn Pro Glu Asn

405

410

415

tat gat ccc tac cga ttt atg cgc atg cgc gag gat cca gac aag gcc

1296

Tyr Asp Pro Tyr Arg Phe Met Arg Met Arg Glu Asp Pro Asp Lys Ala

420

425

430

ttc acc gct caa ttg gag aat acc aac ggt gat cac atc ggc ttc ggc

1344

Phe Thr Ala Gln Leu Glu Asn Thr Asn Gly Asp His Ile Gly Phe Gly

435

440

445

tgg aac cca cgc gct tgt ccc ggg cgg ttc ttc gcc tcg aag gaa atc

1392

Trp Asn Pro Arg Ala Cys Pro Gly Arg Phe Phe Ala Ser Lys Glu Ile

cca gga gac gat gac aaa tac tac cgt cac gct ttt agc gtt cgt atg  
1488  
Pro Gly Asp Asp Asp Lys Tyr Tyr Arg His Ala Phe Ser Val Arg Met  
485 490 495

cat cca acc aca aag ctc atg gta cgc cgg cgc aac gag gac atc ccg  
1536  
His Pro Thr Thr Lys Leu Met Val Arg Arg Arg Asn Glu Asp Ile Pro  
500 505 510

ctc cct cat gac cgg tgc taa  
1557  
Leu Pro His Asp Arg Cys  
515

<210> 48

<211> 518

<212> PRT

<213> Penicillium citrinum

<400> 48

Met Leu Gly Gln Val Leu Leu Thr Val Glu Ser Tyr Gln Trp Val Ser  
1 5 10 15

Thr Pro Gln Ala Leu Val Ala Val Ala Val Leu Leu Ser Leu Ile Ala

20

25

30

Tyr Arg Leu Arg Gly Arg Gln Ser Glu Leu Gln Val Tyr Asn Pro Lys  
                   35                                  40                                  45

Lys Trp Trp Glu Leu Thr Thr Met Arg Ala Arg Gln Asp Phe Asp Thr  
           50                                  55                                  60

Tyr Gly Pro Ser Trp Ile Glu Ala Trp Phe Ser Lys Asn Asp Lys Pro  
   65                                  70                                  75                                  80

Leu Arg Phe Ile Val Asp Ser Gly Tyr Cys Thr Ile Leu Pro Ser Ser  
                                   85                                  90                                  95

Met Ala Asp Glu Phe Arg Lys Ile Lys Asp Met Cys Met Tyr Lys Phe  
                   100                                  105                                  110

Leu Ala Asp Asp Phe His Ser His Leu Pro Gly Phe Asp Gly Phe Lys  
                   115                                  120                                  125

Glu Ile Cys Gln Asp Ala His Leu Val Asn Lys Val Val Leu Asn Gln  
           130                                  135                                  140

Leu Gln Thr Gln Ala Pro Lys Tyr Thr Lys Pro Leu Ala Thr Leu Ala  
   145                                  150                                  155                                  160

Asp Ala Thr Ile Ala Lys Leu Phe Gly Lys Ser Glu Glu Trp Gln Thr  
                                   165                                  170                                  175

Ala Pro Val Tyr Ser Asn Gly Leu Asp Leu Val Thr Arg Thr Val Thr  
                   180                                  185                                  190

Leu Ile Met Val Gly Asp Lys Ile Cys His Asn Glu Glu Trp Leu Asp  
           195                                  200                                  205

Ile Ala Lys Asn His Ala Val Ser Val Ala Val Gln Ala Arg Gln Leu  
           210                                  215                                  220

Arg Val Trp Pro Met Leu Leu Arg Pro Leu Ala His Trp Phe Gln Pro  
 225 230 235 240

Gln Gly Arg Lys Leu Arg Asp Gln Val Arg Arg Ala Arg Lys Ile Ile  
 245 250 255

Asp Pro Glu Ile Gln Arg Arg Arg Ala Glu Lys Ala Ala Cys Val Ala  
 260 265 270

Lys Gly Val Gln Pro Pro Gln Tyr Val Asp Thr Met Gln Trp Phe Glu  
 275 280 285

Asp Thr Ala Asp Gly Arg Trp Tyr Asp Val Ala Gly Ala Gln Leu Ala  
 290 295 300

Met Asp Phe Ala Gly Ile Tyr Ala Ser Thr Asp Leu Phe Val Gly Ala  
 305 310 315 320

Leu Val Asp Ile Ala Arg His Pro Asp Leu Ile Gln Pro Leu Arg Gln  
 325 330 335

Glu Ile Arg Thr Val Ile Gly Glu Gly Gly Trp Thr Pro Ala Ser Leu  
 340 345 350

Phe Lys Leu Lys Leu Leu Asp Ser Cys Met Lys Glu Thr Gln Arg Ile  
 355 360 365

Lys Pro Val Glu Cys Ala Thr Met Arg Ser Thr Ala Leu Arg Asp Ile  
 370 375 380

Thr Leu Ser Asn Gly Leu Phe Ile Pro Lys Gly Glu Leu Ala Ala Val  
 385 390 395 400

Ala Ala Asp Arg Met Asn Asn Pro Asp Val Trp Glu Asn Pro Glu Asn  
 405 410 415

Tyr Asp Pro Tyr Arg Phe Met Arg Met Arg Glu Asp Pro Asp Lys Ala  
 420 425 430

Phe Thr Ala Gln Leu Glu Asn Thr Asn Gly Asp His Ile Gly Phe Gly  
 435 440 445

Trp Asn Pro Arg Ala Cys Pro Gly Arg Phe Phe Ala Ser Lys Glu Ile  
 450 455 460

Lys Ile Leu Leu Ala His Ile Leu Ile Gln Tyr Asp Val Lys Pro Val  
 465 470 475 480

Pro Gly Asp Asp Asp Lys Tyr Tyr Arg His Ala Phe Ser Val Arg Met  
 485 490 495

His Pro Thr Thr Lys Leu Met Val Arg Arg Arg Asn Glu Asp Ile Pro  
 500 505 510

Leu Pro His Asp Arg Cys  
 515

<210> 49

<211> 3522

<212> DNA

<213> Penicillium citrinum

<220>

<221> CDS

<222> (1)..(3522)

<400> 49

atg gtc gct tcg ttg cta ccc tct cgc ttt cgc ggt agg gaa tca atg  
 48

Met Val Ala Ser Leu Leu Pro Ser Arg Phe Arg Gly Arg Glu Ser Met

1

5

10

15



aat cag cag cac cct cta cgc tcg gga aat cgg gca ttg acc tcc aca  
96

Asn Gln Gln His Pro Leu Arg Ser Gly Asn Arg Ala Leu Thr Ser Thr

20

25

30

ctc caa ttt cta tcc aaa acg gcg tgt cta cac ccg atc cat acc gtt  
144

Leu Gln Phe Leu Ser Lys Thr Ala Cys Leu His Pro Ile His Thr Val

35

40

45

tgc acc ata gct att cta gct agt acc aca tac gtt gga cta ctc aaa  
192

Cys Thr Ile Ala Ile Leu Ala Ser Thr Thr Tyr Val Gly Leu Leu Lys

50

55

60

gac agc ttc ttc cat ggc ccc gca aac gtt gat aaa gca gaa tgg ggc  
240

Asp Ser Phe Phe His Gly Pro Ala Asn Val Asp Lys Ala Glu Trp Gly

65

70

75

80

tct ttg gtc gaa gga agt cga agc ttg atc acc ggc cca cag aat ggc  
288

Ser Leu Val Glu Gly Ser Arg Ser Leu Ile Thr Gly Pro Gln Asn Gly

85

90

95

tgg aag tgg cag agc ttc gac ggg gat gca gat gtt ctc gga gat ttc  
336

Trp Lys Trp Gln Ser Phe Asp Gly Asp Ala Asp Val Leu Gly Asp Phe

100

105

110

aac cat caa gca cta atg acc ttg gta ttc ccg ggg tca tat ggg gtt  
384

Asn His Gln Ala Leu Met Thr Leu Val Phe Pro Gly Ser Tyr Gly Val

115

120

125

gca tct caa gca gcc tca cca ttc ctt gct ccc ctc cct gtg aac cta

432  
 Ala Ser Gln Ala Ala Ser Pro Phe Leu Ala Pro Leu Pro Val Asn Leu  
 130 135 140

tct gtg att gac ctt ccc tca acg tcg agc cct tta acc gcc tat tcg  
 480  
 Ser Val Ile Asp Leu Pro Ser Thr Ser Ser Pro Leu Thr Ala Tyr Ser  
 145 150 155 160

aaa gat aaa gtt ttc gcc ttc tct gtg gaa tac agc agc gcg ccg gaa  
 528  
 Lys Asp Lys Val Phe Ala Phe Ser Val Glu Tyr Ser Ser Ala Pro Glu  
 165 170 175

ctc gtg gct gct gtt caa gaa atc ccc aac aac agt gcc gac ctg aaa  
 576  
 Leu Val Ala Ala Val Gln Glu Ile Pro Asn Asn Ser Ala Asp Leu Lys  
 180 185 190

ttg cag gag acg caa ttg atc gag atg gaa cgc cag atg tgg atc atg  
 624  
 Leu Gln Glu Thr Gln Leu Ile Glu Met Glu Arg Gln Met Trp Ile Met  
 195 200 205

aag gct gcc agg gct cac aca aaa cgc agc ctt gct caa tgg gtg cac  
 672  
 Lys Ala Ala Arg Ala His Thr Lys Arg Ser Leu Ala Gln Trp Val His  
 210 215 220

gat acc tgg aca gag tct ctt gat ctt atc aag agc gct caa acg ctc  
 720  
 Asp Thr Trp Thr Glu Ser Leu Asp Leu Ile Lys Ser Ala Gln Thr Leu  
 225 230 235 240

gac gtg gtt gtc atg gtg cta ggt tat ata tca atg cac ttg act ttc  
 768

Asp Val Val Val Met Val Leu Gly Tyr Ile Ser Met His Leu Thr Phe  
 245 250 255

gtc tca ctc ttc ctc agc atg aaa aaa ttg gga tcg aag gtt tgg ctg  
 816  
 Val Ser Leu Phe Leu Ser Met Lys Lys Leu Gly Ser Lys Val Trp Leu  
 260 265 270

gct aca agc gtc ctt ttg tcg tca aca ttt gcc ttt ctc ctc ggt ctc  
 864  
 Ala Thr Ser Val Leu Leu Ser Ser Thr Phe Ala Phe Leu Leu Gly Leu  
 275 280 285

gac gtg gcc ata aga cta ggg gtt ccg atg agc atg agg ttg cta tcc  
 912  
 Asp Val Ala Ile Arg Leu Gly Val Pro Met Ser Met Arg Leu Leu Ser  
 290 295 300

gaa ggc ctc ccc ttc ttg gtg gtg atc gtt ggc ttt gag aag agc atc  
 960  
 Glu Gly Leu Pro Phe Leu Val Val Ile Val Gly Phe Glu Lys Ser Ile  
 305 310 315 320

act ctg acc agg gct gtt ttg tcc tat gct gtg cag cac cga aag ccc  
 1008  
 Thr Leu Thr Arg Ala Val Leu Ser Tyr Ala Val Gln His Arg Lys Pro  
 325 330 335

cag aag ata cag tct gac cag ggt agc gtg aca gcc att gct gaa agt  
 1056  
 Gln Lys Ile Gln Ser Asp Gln Gly Ser Val Thr Ala Ile Ala Glu Ser  
 340 345 350

acc atc aat tac gcc gta cga agc gcc att cgg gag aag ggt tac aat  
 1104  
 Thr Ile Asn Tyr Ala Val Arg Ser Ala Ile Arg Glu Lys Gly Tyr Asn

355	360	365	
atc gtg tgc cac tac gtg gtc gag atc ctg ctc cta gtt atc ggt gct 1152 Ile Val Cys His Tyr Val Val Glu Ile Leu Leu Leu Val Ile Gly Ala			
370	375	380	
gtc tta ggc atc caa ggt ggg cta cag cac ttc tgt gtt cta gct gca 1200 Val Leu Gly Ile Gln Gly Gly Leu Gln His Phe Cys Val Leu Ala Ala			
385	390	395	400
ttg atc ctg ttc ttt gac tgt ctg ctg ctg ttt aca ttc tac act gcg 1248 Leu Ile Leu Phe Phe Asp Cys Leu Leu Leu Phe Thr Phe Tyr Thr Ala			
	405	410	415
att ctg tct atc aag ctc gag gta aac cgc ctc aaa cgt cat atc aac 1296 Ile Leu Ser Ile Lys Leu Glu Val Asn Arg Leu Lys Arg His Ile Asn			
	420	425	430
atg cgg tac gcg ttg gaa gat gag ggt ctc agt cag cgg acg gcg gag 1344 Met Arg Tyr Ala Leu Glu Asp Glu Gly Leu Ser Gln Arg Thr Ala Glu			
435	440	445	
agt gtc gcg acc agc aat gat gcc caa gac agt gca cgt aca tat ctg 1392 Ser Val Ala Thr Ser Asn Asp Ala Gln Asp Ser Ala Arg Thr Tyr Leu			
450	455	460	
ttt ggc aat gat atg aaa ggc agc agt gtt ccg aag ttc aaa ttc tgg 1440 Phe Gly Asn Asp Met Lys Gly Ser Ser Val Pro Lys Phe Lys Phe Trp			

465

470

475

480

atg gtc gtt ggt ttc ctt atc gtc aac ctc gtc aac atc ggc tcc acc  
1488

Met Val Val Gly Phe Leu Ile Val Asn Leu Val Asn Ile Gly Ser Thr

485

490

495

ctt ttc caa gcc tct tct agt gga tcg ttg tcc agt ata tca tct tgg  
1536

Leu Phe Gln Ala Ser Ser Ser Gly Ser Leu Ser Ser Ile Ser Ser Trp

500

505

510

acc gaa agt ctg agc gga tcg gcc att aaa ccc ccg ctt gag ccc ttc  
1584

Thr Glu Ser Leu Ser Gly Ser Ala Ile Lys Pro Pro Leu Glu Pro Phe

515

520

525

aag gta gct gga agt gga cta gat gaa cta ctt ttc cag gca aga ggg  
1632

Lys Val Ala Gly Ser Gly Leu Asp Glu Leu Leu Phe Gln Ala Arg Gly

530

535

540

cgc ggt caa tcg act atg gtc act gtc ctc gcc ccc atc aag tac gaa  
1680

Arg Gly Gln Ser Thr Met Val Thr Val Leu Ala Pro Ile Lys Tyr Glu

545

550

555

560

cta gag tat cct tcc att cac cgt ggt acc tcg cag cta cac gag tat  
1728

Leu Glu Tyr Pro Ser Ile His Arg Gly Thr Ser Gln Leu His Glu Tyr

565

570

575

gga gtt ggt gga aaa atg gtc ggt agc ctg ctc acc agc ctg gaa gat  
1776

Gly Val Gly Gly Lys Met Val Gly Ser Leu Leu Thr Ser Leu Glu Asp

580

585

590

ccc gtc ctc tcc aaa tgg gtg ttt gtg gca ctt gcc cta agt gtc gct  
1824

Pro Val Leu Ser Lys Trp Val Phe Val Ala Leu Ala Leu Ser Val Ala

595

600

605

ctg aac agc tat ctg ttc aag gcc gcc aga ctg gga atc aaa gat cct  
1872

Leu Asn Ser Tyr Leu Phe Lys Ala Ala Arg Leu Gly Ile Lys Asp Pro

610

615

620

aat ctc ccg agt cac cca gtt gat cca gtt gag ctt gac cag gcc gaa  
1920

Asn Leu Pro Ser His Pro Val Asp Pro Val Glu Leu Asp Gln Ala Glu

625

630

635

640

agc ttc aac gct gcc cag aac cag acc cct cag att caa tca agt ctc  
1968

Ser Phe Asn Ala Ala Gln Asn Gln Thr Pro Gln Ile Gln Ser Ser Leu

645

650

655

caa gct cct cag acc aga gtg ttc act cct acc acc acc gac agt gac  
2016

Gln Ala Pro Gln Thr Arg Val Phe Thr Pro Thr Thr Thr Asp Ser Asp

660

665

670

agt gat gcc tca tta gtc tta att aaa gca tct cta aag gtc act aag  
2064

Ser Asp Ala Ser Leu Val Leu Ile Lys Ala Ser Leu Lys Val Thr Lys

675

680

685

cga gca gaa gga aag aca gcc act agt gaa ctt ccc gtg tct cgc aca  
2112

Arg Ala Glu Gly Lys Thr Ala Thr Ser Glu Leu Pro Val Ser Arg Thr

690

695

700



caa atc gaa ctg gac aat ttg ctg aag cag aac aca atc agc gag ttg  
2160

Gln Ile Glu Leu Asp Asn Leu Leu Lys Gln Asn Thr Ile Ser Glu Leu

705

710

715

720

aac gat gag gat gtc gtt gcc ttg tct ttg cgg gga aag gtt ccc ggg  
2208

Asn Asp Glu Asp Val Val Ala Leu Ser Leu Arg Gly Lys Val Pro Gly

725

730

735

tat gcc cta gag aag agt ctc aaa gac tgc act cgt gcc gtc aag gtt  
2256

Tyr Ala Leu Glu Lys Ser Leu Lys Asp Cys Thr Arg Ala Val Lys Val

740

745

750

cgc cgc tct atc att tcg agg aca ccg gct acc gca gag ctt aca agt  
2304

Arg Arg Ser Ile Ile Ser Arg Thr Pro Ala Thr Ala Glu Leu Thr Ser

755

760

765

atg ctg gag cac tcg aag ctg ccg tac gaa aac tac gcc tgg gaa cgc  
2352

Met Leu Glu His Ser Lys Leu Pro Tyr Glu Asn Tyr Ala Trp Glu Arg

770

775

780

gtg ctc ggt gca tgt tgc gag aac gtt att ggc tat atg cca gtc cct  
2400

Val Leu Gly Ala Cys Cys Glu Asn Val Ile Gly Tyr Met Pro Val Pro

785

790

795

800

gtt ggc gtc gcc ggt cct att gtt atc gac ggc aag agt tat ttc att  
2448

Val Gly Val Ala Gly Pro Ile Val Ile Asp Gly Lys Ser Tyr Phe Ile

805

810

815

cct atg gca acc acc gag ggc gtc ctc gtc gct agt gct agc cgt ggc

2496

Pro Met Ala Thr Thr Glu Gly Val Leu Val Ala Ser Ala Ser Arg Gly

820

825

830

agt aag gca atc aac ctc ggt ggc ggt gcc gtg aca gtc ctg act ggc

2544

Ser Lys Ala Ile Asn Leu Gly Gly Gly Ala Val Thr Val Leu Thr Gly

835

840

845

gac ggt atg aca cga ggc ccg tgt gtg aag ttt gat gtc ctt gaa cga

2592

Asp Gly Met Thr Arg Gly Pro Cys Val Lys Phe Asp Val Leu Glu Arg

850

855

860

gct ggt gct gct aag atc tgg ctc gat tcg gac gtc ggc cag acc gta

2640

Ala Gly Ala Ala Lys Ile Trp Leu Asp Ser Asp Val Gly Gln Thr Val

865

870

875

880

atg aaa gaa gcc ttc aat tca acc agc aga ttt gcg cgc tta caa agt

2688

Met Lys Glu Ala Phe Asn Ser Thr Ser Arg Phe Ala Arg Leu Gln Ser

885

890

895

atg cgg aca act atc gcc ggt act cac tta tat att cga ttt aag act

2736

Met Arg Thr Thr Ile Ala Gly Thr His Leu Tyr Ile Arg Phe Lys Thr

900

905

910

act act ggc gac gct atg gga atg aat atg att tct aag ggc gtg gag

2784

Thr Thr Gly Asp Ala Met Gly Met Asn Met Ile Ser Lys Gly Val Glu

915

920

925

cat gca ctg aat gtt atg gcg aca gag gca ggt ttc agc gat atg aat

2832

His Ala Leu Asn Val Met Ala Thr Glu Ala Gly Phe Ser Asp Met Asn

930

935

940

att att acc cta tca gga aat tac tgt acg gat aag aaa cct tca gct  
2880

Ile Ile Thr Leu Ser Gly Asn Tyr Cys Thr Asp Lys Lys Pro Ser Ala

945

950

955

960

ttg aat tgg atc gat gga cgg ggc aag ggc att gtg gcc gaa gcc atc  
2928

Leu Asn Trp Ile Asp Gly Arg Gly Lys Gly Ile Val Ala Glu Ala Ile

965

970

975

ata ccg gcg aac gtt gtc agg gat gtc tta aag agc gat gtg gat agc  
2976

Ile Pro Ala Asn Val Val Arg Asp Val Leu Lys Ser Asp Val Asp Ser

980

985

990

atg gtt cag ctc aac ata tcg aaa aat ctg att ggg tcc gct atg gct  
3024

Met Val Gln Leu Asn Ile Ser Lys Asn Leu Ile Gly Ser Ala Met Ala

995

1000

1005

ggc tca gtt ggc ggc ttc aac gcc caa gct gcc aat ctt gcg gca  
3069

Gly Ser Val Gly Gly Phe Asn Ala Gln Ala Ala Asn Leu Ala Ala

1010

1015

1020

gcc att ttc att gcc aca ggt cag gat ccg gcg caa gtt gtg gag  
3114

Ala Ile Phe Ile Ala Thr Gly Gln Asp Pro Ala Gln Val Val Glu

1025

1030

1035

agc gct aac tgc atc act ctc atg aac aat ctt cgc gga tcg ctt  
3159

Ser Ala Asn Cys Ile Thr Leu Met Asn Asn Leu Arg Gly Ser Leu

1040	1045	1050
caa atc 3204 Gln Ile	tct gtc tcc atg ccg Ser Val Ser Met Pro	tct att gag gtt gga acg ttg ggc Ser Ile Glu Val Gly Thr Leu Gly
1055	1060	1065
ggt ggt 3249 Gly Gly	acg att ctg gag ccc Thr Ile Leu Glu Pro	cag ggc gca atg ctt gac atg ctt Gln Gly Ala Met Leu Asp Met Leu
1070	1075	1080
ggt gtc 3294 Gly Val	cgc gga tca cac ccg Arg Gly Ser His Pro	acc act ccc ggt gag aat gca cgt Thr Thr Pro Gly Glu Asn Ala Arg
1085	1090	1095
caa ctt 3339 Gln Leu	gcg cgc atc atc gga Ala Arg Ile Ile Gly	agc gct gtt ttg gct ggg gag ctc Ser Ala Val Leu Ala Gly Glu Leu
1100	1105	1110
tcg cta 3384 Ser Leu	tgt gct gcc cta gcc Cys Ala Ala Leu Ala	gcc ggt cac ctg gtc aag gcg cac Ala Gly His Leu Val Lys Ala His
1115	1120	1125
atg gcg 3429 Met Ala	cac aac cgt tct gcc His Asn Arg Ser Ala	ccg gca tct tca gcc cct tct cga Pro Ala Ser Ser Ala Pro Ser Arg
1130	1135	1140
agt gtc 3474 Ser Val	tcc ccg tca ggc gga Ser Pro Ser Gly Gly	acc agg aca gtc cct gtt cct aac Thr Arg Thr Val Pro Val Pro Asn

1145

1150

1155

aat gca ctg agg ccg agt gct gca gct act gat cgg gct cga cgc  
3519

Asn Ala Leu Arg Pro Ser Ala Ala Ala Thr Asp Arg Ala Arg Arg

1160

1165

1170

tga  
3522

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<212> PRT

<213> Penicillium citrinum

<400> 50

Met Val Ala Ser Leu Leu Pro Ser Arg Phe Arg Gly Arg Glu Ser Met  
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Asn Gln Gln His Pro Leu Arg Ser Gly Asn Arg Ala Leu Thr Ser Thr  
20 25 30

Leu Gln Phe Leu Ser Lys Thr Ala Cys Leu His Pro Ile His Thr Val  
35 40 45

Cys Thr Ile Ala Ile Leu Ala Ser Thr Thr Tyr Val Gly Leu Leu Lys  
50 55 60

Asp Ser Phe Phe His Gly Pro Ala Asn Val Asp Lys Ala Glu Trp Gly  
65 70 75 80

Ser Leu Val Glu Gly Ser Arg Ser Leu Ile Thr Gly Pro Gln Asn Gly  
85 90 95

Trp	Lys	Trp	Gln	Ser	Phe	Asp	Gly	Asp	Ala	Asp	Val	Leu	Gly	Asp	Phe
			100					105					110		
Asn	His	Gln	Ala	Leu	Met	Thr	Leu	Val	Phe	Pro	Gly	Ser	Tyr	Gly	Val
		115					120					125			
Ala	Ser	Gln	Ala	Ala	Ser	Pro	Phe	Leu	Ala	Pro	Leu	Pro	Val	Asn	Leu
	130					135					140				
Ser	Val	Ile	Asp	Leu	Pro	Ser	Thr	Ser	Ser	Pro	Leu	Thr	Ala	Tyr	Ser
145					150					155					160
Lys	Asp	Lys	Val	Phe	Ala	Phe	Ser	Val	Glu	Tyr	Ser	Ser	Ala	Pro	Glu
				165					170					175	
Leu	Val	Ala	Ala	Val	Gln	Glu	Ile	Pro	Asn	Asn	Ser	Ala	Asp	Leu	Lys
			180					185					190		
Leu	Gln	Glu	Thr	Gln	Leu	Ile	Glu	Met	Glu	Arg	Gln	Met	Trp	Ile	Met
		195					200					205			
Lys	Ala	Ala	Arg	Ala	His	Thr	Lys	Arg	Ser	Leu	Ala	Gln	Trp	Val	His
	210					215					220				
Asp	Thr	Trp	Thr	Glu	Ser	Leu	Asp	Leu	Ile	Lys	Ser	Ala	Gln	Thr	Leu
225					230					235					240
Asp	Val	Val	Val	Met	Val	Leu	Gly	Tyr	Ile	Ser	Met	His	Leu	Thr	Phe
				245					250					255	
Val	Ser	Leu	Phe	Leu	Ser	Met	Lys	Lys	Leu	Gly	Ser	Lys	Val	Trp	Leu
			260					265					270		
Ala	Thr	Ser	Val	Leu	Leu	Ser	Ser	Thr	Phe	Ala	Phe	Leu	Leu	Gly	Leu
		275					280					285			
Asp	Val	Ala	Ile	Arg	Leu	Gly	Val	Pro	Met	Ser	Met	Arg	Leu	Leu	Ser
	290					295					300				



Glu Gly Leu Pro Phe Leu Val Val Ile Val Gly Phe Glu Lys Ser Ile  
305 310 315 320

Thr Leu Thr Arg Ala Val Leu Ser Tyr Ala Val Gln His Arg Lys Pro  
325 330 335

Gln Lys Ile Gln Ser Asp Gln Gly Ser Val Thr Ala Ile Ala Glu Ser  
340 345 350

Thr Ile Asn Tyr Ala Val Arg Ser Ala Ile Arg Glu Lys Gly Tyr Asn  
355 360 365

Ile Val Cys His Tyr Val Val Glu Ile Leu Leu Leu Val Ile Gly Ala  
370 375 380

Val Leu Gly Ile Gln Gly Gly Leu Gln His Phe Cys Val Leu Ala Ala  
385 390 395 400

Leu Ile Leu Phe Phe Asp Cys Leu Leu Leu Phe Thr Phe Tyr Thr Ala  
405 410 415

Ile Leu Ser Ile Lys Leu Glu Val Asn Arg Leu Lys Arg His Ile Asn  
420 425 430

Met Arg Tyr Ala Leu Glu Asp Glu Gly Leu Ser Gln Arg Thr Ala Glu  
435 440 445

Ser Val Ala Thr Ser Asn Asp Ala Gln Asp Ser Ala Arg Thr Tyr Leu  
450 455 460

Phe Gly Asn Asp Met Lys Gly Ser Ser Val Pro Lys Phe Lys Phe Trp  
465 470 475 480

Met Val Val Gly Phe Leu Ile Val Asn Leu Val Asn Ile Gly Ser Thr  
485 490 495

Leu Phe Gln Ala Ser Ser Ser Gly Ser Leu Ser Ser Ile Ser Ser Trp

500					505					510					
Thr	Glu	Ser	Leu	Ser	Gly	Ser	Ala	Ile	Lys	Pro	Pro	Leu	Glu	Pro	Phe
		515					520					525			
Lys	Val	Ala	Gly	Ser	Gly	Leu	Asp	Glu	Leu	Leu	Phe	Gln	Ala	Arg	Gly
	530					535					540				
Arg	Gly	Gln	Ser	Thr	Met	Val	Thr	Val	Leu	Ala	Pro	Ile	Lys	Tyr	Glu
545					550					555					560
Leu	Glu	Tyr	Pro	Ser	Ile	His	Arg	Gly	Thr	Ser	Gln	Leu	His	Glu	Tyr
				565					570					575	
Gly	Val	Gly	Gly	Lys	Met	Val	Gly	Ser	Leu	Leu	Thr	Ser	Leu	Glu	Asp
			580					585					590		
Pro	Val	Leu	Ser	Lys	Trp	Val	Phe	Val	Ala	Leu	Ala	Leu	Ser	Val	Ala
		595					600					605			
Leu	Asn	Ser	Tyr	Leu	Phe	Lys	Ala	Ala	Arg	Leu	Gly	Ile	Lys	Asp	Pro
	610					615					620				
Asn	Leu	Pro	Ser	His	Pro	Val	Asp	Pro	Val	Glu	Leu	Asp	Gln	Ala	Glu
625					630					635					640
Ser	Phe	Asn	Ala	Ala	Gln	Asn	Gln	Thr	Pro	Gln	Ile	Gln	Ser	Ser	Leu
				645					650					655	
Gln	Ala	Pro	Gln	Thr	Arg	Val	Phe	Thr	Pro	Thr	Thr	Thr	Asp	Ser	Asp
			660					665					670		
Ser	Asp	Ala	Ser	Leu	Val	Leu	Ile	Lys	Ala	Ser	Leu	Lys	Val	Thr	Lys
		675					680					685			
Arg	Ala	Glu	Gly	Lys	Thr	Ala	Thr	Ser	Glu	Leu	Pro	Val	Ser	Arg	Thr
	690					695					700				

Gln Ile Glu Leu Asp Asn Leu Leu Lys Gln Asn Thr Ile Ser Glu Leu  
705 710 715 720

Asn Asp Glu Asp Val Val Ala Leu Ser Leu Arg Gly Lys Val Pro Gly  
725 730 735

Tyr Ala Leu Glu Lys Ser Leu Lys Asp Cys Thr Arg Ala Val Lys Val  
740 745 750

Arg Arg Ser Ile Ile Ser Arg Thr Pro Ala Thr Ala Glu Leu Thr Ser  
755 760 765

Met Leu Glu His Ser Lys Leu Pro Tyr Glu Asn Tyr Ala Trp Glu Arg  
770 775 780

Val Leu Gly Ala Cys Cys Glu Asn Val Ile Gly Tyr Met Pro Val Pro  
785 790 795 800

Val Gly Val Ala Gly Pro Ile Val Ile Asp Gly Lys Ser Tyr Phe Ile  
805 810 815

Pro Met Ala Thr Thr Glu Gly Val Leu Val Ala Ser Ala Ser Arg Gly  
820 825 830

Ser Lys Ala Ile Asn Leu Gly Gly Gly Ala Val Thr Val Leu Thr Gly  
835 840 845

Asp Gly Met Thr Arg Gly Pro Cys Val Lys Phe Asp Val Leu Glu Arg  
850 855 860

Ala Gly Ala Ala Lys Ile Trp Leu Asp Ser Asp Val Gly Gln Thr Val  
865 870 875 880

Met Lys Glu Ala Phe Asn Ser Thr Ser Arg Phe Ala Arg Leu Gln Ser  
885 890 895

Met Arg Thr Thr Ile Ala Gly Thr His Leu Tyr Ile Arg Phe Lys Thr  
900 905 910

Thr Thr Gly Asp Ala Met Gly Met Asn Met Ile Ser Lys Gly Val Glu  
 915 920 925

His Ala Leu Asn Val Met Ala Thr Glu Ala Gly Phe Ser Asp Met Asn  
 930 935 940

Ile Ile Thr Leu Ser Gly Asn Tyr Cys Thr Asp Lys Lys Pro Ser Ala  
 945 950 955 960

Leu Asn Trp Ile Asp Gly Arg Gly Lys Gly Ile Val Ala Glu Ala Ile  
 965 970 975

Ile Pro Ala Asn Val Val Arg Asp Val Leu Lys Ser Asp Val Asp Ser  
 980 985 990

Met Val Gln Leu Asn Ile Ser Lys Asn Leu Ile Gly Ser Ala Met Ala  
 995 1000 1005

Gly Ser Val Gly Gly Phe Asn Ala Gln Ala Ala Asn Leu Ala Ala  
 1010 1015 1020

Ala Ile Phe Ile Ala Thr Gly Gln Asp Pro Ala Gln Val Val Glu  
 1025 1030 1035

Ser Ala Asn Cys Ile Thr Leu Met Asn Asn Leu Arg Gly Ser Leu  
 1040 1045 1050

Gln Ile Ser Val Ser Met Pro Ser Ile Glu Val Gly Thr Leu Gly  
 1055 1060 1065

Gly Gly Thr Ile Leu Glu Pro Gln Gly Ala Met Leu Asp Met Leu  
 1070 1075 1080

Gly Val Arg Gly Ser His Pro Thr Thr Pro Gly Glu Asn Ala Arg  
 1085 1090 1095

Gln Leu Ala Arg Ile Ile Gly Ser Ala Val Leu Ala Gly Glu Leu

1100

1105

1110

Ser Leu Cys Ala Ala Leu Ala Ala Gly His Leu Val Lys Ala His  
 1115 1120 1125

Met Ala His Asn Arg Ser Ala Pro Ala Ser Ser Ala Pro Ser Arg  
 1130 1135 1140

Ser Val Ser Pro Ser Gly Gly Thr Arg Thr Val Pro Val Pro Asn  
 1145 1150 1155

Asn Ala Leu Arg Pro Ser Ala Ala Ala Thr Asp Arg Ala Arg Arg  
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&lt;211&gt; 20

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 20

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atgtccctgc cgcatgcaac  
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